The Self-Sufficient Gardener

by: John Seymour

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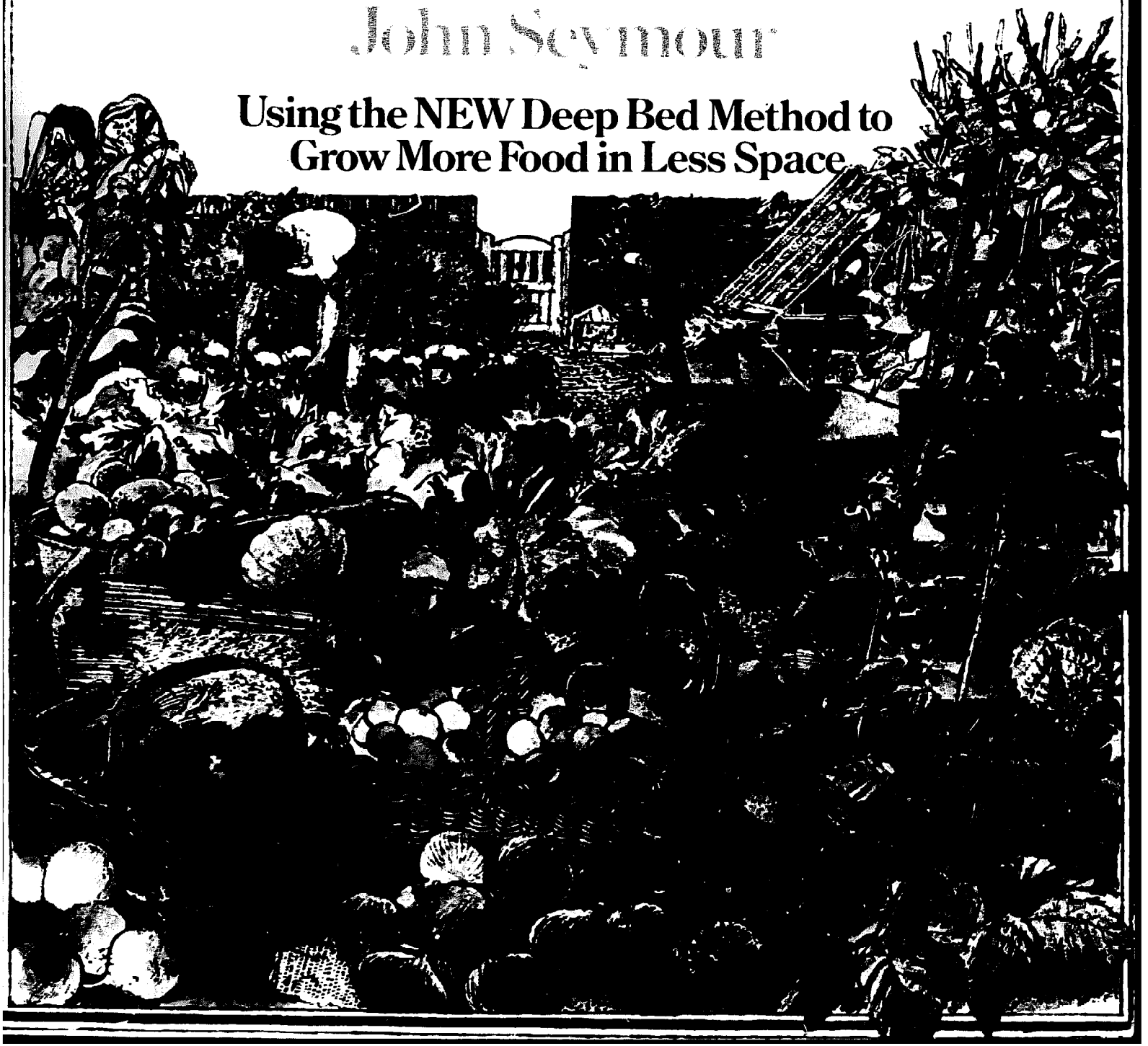
A COMPLETE GUIDE TO GROWING AND PRESERVING ALL YOUR OWN FOOD

The Self-Sufficient Gardener

John Seymour

Using the NEW Deep Bed Method to Grow More Food in Less Space



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The Self-Sufficient Gardener

The Self-Sufficient Gardener is a unique, detailed guide for the home gardener who wants to provide for all his own food throughout the year. Wherever you live and whatever the size of your garden – whether it be a large country plot, a small back yard or just an average suburban yard – John Seymour's practical, common sense advice will work for you.

He shows you how to make the best use of your land according to its size and position, how to improve the quality of its soil, how to choose and rotate the fruits and vegetables that will keep you in food the year round, and, most important, how to produce bigger and better crops. Text and illustrations explain with step-by-step clarity the whole process of growing every vegetable, fruit and herb, from sowing to harvesting. Storing, canning, salting, drying and freezing; making jam, wine and cider; assembling a greenhouse; growing under glass; keeping bees and chickens; mending fences; choosing tools – these and related topics are also treated with the same careful attention to detail.

But this book also offers something more. Along with the instructions for gardening by traditional organic methods, John Seymour explains an amazingly successful new method of obtaining much higher yields from small amounts of land. The Deep Bed Method, as he calls it, is adapted from age-old techniques practiced in China, which gardeners in California have recently been exploring under the name Biodynamic-French intensive vegetable gardening. A simple process essentially, it involves digging a deep bed which is never walked on, enriching the soil with organic matter, and planting the vegetables close together. Because the plants are growing in very rich, loose soil, their roots can grow down instead of sideways, providing higher yields than would be possible in the same space under normal cultivation.

An added advantage is that once the deep beds have been established, this bigger harvest will be produced with far less physical work on your part, since the garden will require less water to keep the plants healthy and the close planting of the vegetables helps prevent weeds.

John Seymour has lived a self-sufficient life for over twenty years and has been growing his own vegetables and fruit for over forty years. It is this knowledge and first hand experience gathered from a lifetime of food gardening, blended with over 700 original drawings and diagrams that makes The Self-Sufficient Gardener *the* authoritative reference for all food gardeners.

John Seymour spent ten years in Africa where, among other things, he managed a sheep and cattle farm. After service in World War II, he traveled widely, lived on a fishing boat, wrote, broadcast and studied the way of life of rural people. Then with his wife Sally, he settled down to running a self-sufficient small property in Suffolk, England. Later they moved to a 62-acre farm which is being developed as a school in the art of self-sufficiency. One of the principal features of the farm is its thriving vegetable garden; this not only feeds the people on the farm, it also provides a surplus to sell in the market place. John Seymour is the author of several books, including **The Guide To Self-Sufficiency, Farming For Self-Sufficiency** and **The Fat Of The Land.**

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The Self-Sufficient Gardener

A Complete Guide to Growing and Preserving All Your Own Food

JOHN SEYMOUR

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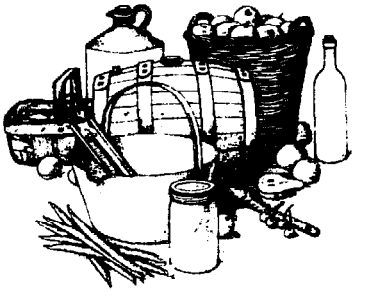


Introduction

When I was a boy in the countryside – fifty years ago and more – people really did garden for self-sufficiency, but it would not have occurred to them to do otherwise. People were self-reliant because they had to be: it was a way of life. They were doing what generations had done before them; simply carrying on a traditional way of life. Money was a rare commodity: far too valuable to be spent on things you could grow or make yourself. It was spent on tools or fabric for clothes or luxury foods like tea and coffee. They would have laughed at a diet of store-bought foods – such an extravagance. Even in my own childhood rural towns were far apart and roads were often bad. Many were not passable in winter snows or muddy spring thaws. To have a few chickens, a pig in the sty and a vegetable patch, was simply common sense. These country gardens were enormously productive. They were bursting with fertility derived from the compost heap and the manure of the animals.

As people grew richer and food became cheaper, and as farming became increasingly mechanized, sending more and more countrymen into the cities to earn their livings, so these small-scale food-producing gardens declined in popularity. During World War II "victory gardens" gained favor, but the fashion died and soon the roses took over from the rhubarb. Gardens acquired a new role, that of a status symbol. Neighbors compared the greenness of the lawn, the diameters of their dahlias and the size of their patios. The supermarket trolley replaced the wheel barrow and vegetables were bought canned, frozen and dried.

But now, once again, the pendulum is swinging the other way. As food, and everything else, is becoming more expensive, there is coming about a great renaissance of gardening for self-sufficiency. People find that they are saving a significant part of their salaries by doing it, that their food tastes better and does them more good, and that their children are healthier. They themselves benefit from some hard work in the fresh air, and from being involved with the benign cycle of the seasons and with the satisfying process of helping nature create beautiful and nourishing food out of what is apparently nothing.

In the United States plots of land for food-growing are sought with great eagerness. And where a few years ago, in Europe, there were plenty of allotments with nobody working them, now there is a waiting list everywhere for allotments. Everywhere gardening is losing its image as a retired person's sport; young people are learning

to do it and lively minds are getting to work on new techniques.

Organic gardening

Alongside this re-emergence of the desire to grow food has come an awareness that the earth's supply of mineral-derived energy is limited. Simplistic gardening with chemical fertilizers is becoming a thing of the past as the new generation of gardeners is learning to do without the petrochemicals on which gardening has become dependent, and to rely solely on nature's very own methods. People are re-discovering the value of waste organic matter – animal and vegetable. Methods of making compost and of keeping animals in the garden are again being treated as matters of crucial importance.

The whole question of chemical versus organic gardening is still, at the present time, a major controversy. In my view the best proof is in the eating. My own garden is far from perfect. I sow more than I can reap, like most serious gardeners, and end up with too many weeds, not enough time to hoe them, and occasionally crops that I am ashamed of. But on the whole my garden is lush and fertile, and I grow a great deal of produce in it. Orthodox gardeners, who use chemicals on their gardens, come and look at my crops sometimes and refuse to believe that I put no inorganic fertilizer on them. But I don't: not an ounce of artificial nitrogen has gone on my land for thirteen years now. And even when the weeds do overwhelm me, I am often surprised that there seems to be fertility enough for them and my crops. This year my onions, carrots and parsnips, which were all interplanted with each other, were neglected and overrun with weeds. And yet out of the mess, I have dug large and beautiful carrots and parsnips, and the onions, all hanging in strings now, are twice as big as my fist, luscious and firm.

I am not advocating the cultivation of weeds. But rather than douse them with some "selective weed spray" (which is only selective up to a point of course – if a chemical damages one form of life you can be sure that it will do at least some damage to many other forms of life), I would rather have a few weeds and maybe a slightly smaller crop.

I am surprised when I read the advice of many gardening writers that their readers should apply this or that amount of "complete fertilizer", or of some proprietary high-nitrogen chemical, or that the soil should be doused with herbicides, pesticides, or fungicides ("cide" means kill and no gardener should forget that fact). I wonder whether these writers have tried gardening without chemicals. Applied nitrates definitely harm the soil in the long term, although it must be admitted that they have a dramatic effect on the growth of crops in soil that is already hooked on them – that is to say soil which therefore has no nitrogen-fixing capacity of its own. However, the main point that needs to be made is that some of the best garden – and farm – crops in the world are grown without any of these expensive and dangerous aids at all. The highest yield possible with any crop can be, and very often is, achieved without chemicals.

But here there is a trap that many a would-be organic gardener has fallen into. "I am 'organic'; I don't put any artificial fertilizers on my land", they say. But neither do they put anything else! Nothing will come out of nothing, and if you continue to take crops out of your soil and put nothing back you will eventually grow – well, next to nothing. If you see a garden, which is held to be organic, filled with nothing but miserable insect-eaten crops surrounded by weeds, it is probable that you have encountered this negative approach. Some advocates of organic gardening also put forward eccentric notions like planting crops according to the phases of the moon, sprinkling tiny amounts of obscure substances on the soil, and so on. Plant seeds will germinate and plants will grow when temperature, humidity, and nutrients are right for them. The organic philosophy has no need of these irrational and superstitious notions. The organic approach is based on sound fact and science, and its practice can be seen to be effective and correct.

The organic philosophy is well summed up as adherence to the following six laws: first, the gardener must work with nature and not against it; second, nature is diverse and therefore the gardener must practise diversity; third, the gardener must husband other forms of life – animal or vegetable – in environments as close as possible to those for which they evolved; fourth, the gardener must return to the soil as much, or nearly as much, as he takes from it; fifth, the gardener must feed the soil and not the plant; sixth, the gardener must study nature as a whole and never any part of it in isolation.

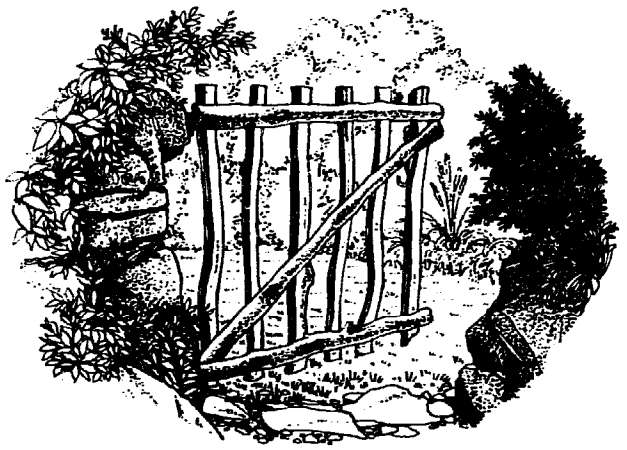
Garden animals

It is, of course, possible to live on vegetables alone. In fact, it is theoretically possible to live on peas, beans and potatoes, if you have enough of

them. However, those gardeners who are not vegetarians will find that on even the smallest pieces of land, they can keep rabbits, chickens or both. Any animals you have will make a major contribution to the fertility of your garden, and if you add rabbit and chicken meat, and eggs, to your vegetable and fruit produce you can certainly be a self-sufficient gardener in the true sense, and you will be coming close to providing yourself with the varied diet that is now fairly commonplace in the West. Dairy products and the meat of large animals will be almost the only things that you need to buy.

Many people feel that animals will tie them down; they won't be able to take a vacation, or even go away for the weekend. But what if they team up with neighbors, and either keep birds and animals cooperatively, or else agree to take turns at looking after each others'? To feed a few rabbits and a few hens, and collect the eggs, is the work of minutes a day.

The advantage of keeping birds and animals is immense. As well as the food they provide, almost more important is the fertility they give to the garden. Detailed instructions for keeping garden animals are given on pp. 230 to 239.



I have organized the chapters of this book in which I discuss the cultivation of vegetables and fruit (see pp. 113-190) on the basis of the natural families and orders into which plants have been grouped by botanists. I have done this because there are very close relationships between plants of the same family and you will find that if you think of plants in terms of their relations, you will eventually get a very real feeling for the characters of the different plants.

For example, you grow potatoes and tomatoes for quite different reasons: the former for its underground tubers and the latter for its fruit. You could, of course, grow them successfully for years without realizing that they are very closely related. But once you have them classified in your head as members of the *Solanaceae*, or nightshade family, you immediately see and feel their close relationship and take an interest in it. And, of course, you soon find that potatoes and tomatoes suffer from all the same diseases and respond well or ill to much the same sort of treatment.

It is also fun to spot the similarities which make, for example, apples, strawberries and roses close relations. It is useful to know that pears are closely related to hawthorns, and plums to sloes, for it is well worth grafting scions, or fruiting spurs, of fruit trees on to the root stocks of their wild, and therefore more hardy, relations. A sense of the specialness, similarities, and differences, of different kinds of plants adds enormously to the pleasure of gardening; it gives an insight into plants and engenders in the gardener the sort of sympathy that good husbandmen should have – the sympathy which is best described by the phrase "green fingers".

Finally, let me stress that self-sufficient gardening needs commitment. It requires the determination to produce as much good food as is humanly possible on whatever area of land is at your disposal. Every patio, every flat roof, every window sill, should be looked upon as a possible food-producing area. New methods of organic gardening which produce high yields in small spaces should be considered. More than this, self-sufficient gardening requires a commitment to understanding your plants, your soil and the workings of nature: its seasons and its cycles. I have given over a chapter of this book to explain the workings of the seasons. Other chapters discuss the growing of the individual varieties of vegetables, fruit and herbs in detail. In the remainder of this introduction I shall try to explain about the soil and the cycles of nature as I understand them. But before I move on to these topics, I should like to introduce you to the deep bed method of gardening.

THE DEEP BED METHOD

Unless you have a very large area of land at your disposal, the key to success as a self-sufficient gardener is to be able to grow a lot in a small space. Of the new techniques for growing more vegetables in smaller areas, the most important in my view is what I call the Deep Bed Method, which is being developed in California by several

Americans, several Chinese immigrants and an Englishman called Alan Chadwick. The method is derived from age-old techniques that have been practiced in France and China, but which have never been widely adopted in the West.

The essence of the method is to dig deeply and then never tread on the bed. This means your plants are growing in very loose, deeply dug soil; their roots will go down instead of sideways. You therefore get bigger plants, and can grow them closer together. The Deep Bed Method is discussed in detail on pp. 106 to 112. Throughout the chapters on the Cultivation of Vegetables and Fruit (pp. 113-190), I have included instructions for growing each crop by the Deep Bed Method, wherever this differs from conventional practice.

A deep bed should produce about four times the yield by weight that a conventional bed will produce. A deep bed of 100 square feet (9 sq m) can produce from 200 to 400 lbs (90-180 kg) of vegetables a year. According to the US Department of Agriculture's statistics the average American eats 322 lbs (145 kg) of vegetables a year. Thus one tiny bed – just pace out 20 feet by 5 feet (6 x 1.5m) on the floor to get an idea of the size of it – can keep one adult in vegetables.

From what I have seen of deep bed gardens and from my first hand experience on my own land, I can say that the claims made for this method are by no means exaggerated. I think it highly likely that more and more serious vegetable gardeners will adopt this method. If your aim is to grow as many vegetables as you can in the space available to you, then I urge you to study the technique and try it.

NATURE'S CYCLES

Early in the evolution of living things the animal and vegetable kingdoms diverged along different paths. Since then they have evolved in co-existence, each dependent on the other. Plants are essential to animals, for only plants can store the energy of the sun by photosynthesis, and fix the free nitrogen in the air into compounds from which both they and the animals can draw energy.

A DEEP BED

You can create a deep bed by digging to a spade's depth and loosening the soil to a further spade's depth. You must incorporate a large amount of manure and never tread on the bed. The very loose soil will allow the roots of your crops to penetrate deep down, instead of spreading sideways as they do in conventional beds. You will get bigger vegetables and you will be able to grow them closer together.

At the same time plants could not exist without animals. Nearly all flowering plants – which means nearly all the higher plants – are dependent on animals, especially birds and insects, for pollination. Without animals they could not reproduce. But beyond this, there is a benign cycle between plants and animals at all stages of their lives. Plants inhale carbon dioxide, which would kill animals in too great a quantity, and exhale oxygen without which animals cannot live. Animals inhale the oxygen and exhale the carbon dioxide which is needed by plants.

Animals consume plants and, quite simply, transform plant tissue into more complex matter. Simple plant protein is converted into more complex animal protein. Animals void such food as they cannot directly absorb, and this falls on the earth making instantly-available food which is taken up again by plants. Plants feed animals, and animals feed plants. This is the basic cycle of nature without which life on this planet would cease to exist.

As well as the animal-plant cycle, there are other natural cycles, which define the ceaseless circulation of the elements within the earth's atmosphere. Two of these are of the utmost importance to gardeners: the water cycle and the nitrogen cycle.

The water cycle

The water cycle is the simpler of the two. Put briefly, water is evaporated from the sea, the lakes, the rivers and the soil by the sun and it is also transpired by plants and animals. It is carried about the atmosphere by winds, precipitated in the form of rain or snow, some of which falls back into the sea, but much of which falls on the land.

If it falls on good soil, with plenty of humus in it, it soaks in. Some of it remains in the soil, held like water in a sponge. The rest sinks down deeper, until it reaches impervious rock. It then makes its way down any slope it can until, perhaps, it emerges on the surface lower down a hill, runs down to a stream, and eventually it gets to the sea.

Now such water as remains in the soil may possibly reach the surface and be evaporated again, or it may be taken up by a plant, in which case it will probably enter the roots of the plant. It will ascend the plant, carrying whatever soluble chemicals there are dissolved in it, for it has taken these things up from the soil. Some of this water will make part of the plant's tissues, and deliver the nutrients it has in solution to the various cells of the plant. The remaining water, which is not taken into the plant tissue, will be transpired through the stomata of the leaves, the small apertures in the leaves' skin.

Without this movement of water from the soil below it to the sky above it, a plant could not eat, nor could it grow. Plants depend entirely on water to bring them their food. This does not mean that you have to swamp your plants with water. Most land plants need moist soil, not waterlogged soil, to keep them healthy and growing. If their roots are immersed completely in water for any length of time, ultimately they will die.

The nitrogen cycle

Nitrogen is an essential ingredient of all plants and animals. The air is a mixture of oxygen and nitrogen; but the two elements are not in compound, simply in mixture. This means that the nitrogen is what is called "free nitrogen", meaning that it is still free to combine with another element, or elements, to form a compound. But the higher plants cannot use free nitrogen: they must have it combined as a compound with at least one other element. For example one part of nitrogen combined with three parts of hydrogen produces ammonia which, when it has undergone further changes, can be used by plants.

Fortunately certain bacteria, and certain algae, are capable of "fixing" nitrogen, in other words making it available to higher forms of life in the form of a compound. Also the tremendous power in a flash of lightning can fix nitrogen. (It has been conjectured that nitrogen fixed by lightning made possible the first forms of life on Earth.) And nitrogen can also be fixed artificially by the same process as lightning uses. Nitrogen can be combined artificially with hydrogen to form ammonia. The ammonia can then be combined with oxygen and other chemicals to make such substances as ammonium sulfate, urea, ammonium nitrate, sodium nitrate and calcium nitrate, all of which are used as artificial nitrogen fertilizers.

Nitrogen fixation by artificial means requires one constant: an enormous expenditure of power. Therefore, as power becomes more expensive, and more difficult and dangerous to produce, the nitrogen fixed free by bacteria becomes more and more valuable. Fortunately, by employing perfectly simple and well-tried methods of gardening, you can encourage nitrogen fixation by natural means and grow crops as good as any that ever have been grown with artificial nitrogen, with nitrogen fixed by natural agencies alone.

If you study the illustration and caption below, you will see that much fixed nitrogen simply goes around in a short circle – plants, micro-organisms, plants, micro-organisms and so on – and in good soil conditions, little nitrogen is released into the air. But any that is released to the air comes back again, eventually, fixed by nitrogen-fixing bacteria.

Other fixed nitrogen goes in a rather longer circle – plants, animals, micro-organisms, plants, animals and so on. No chemist or biologist has ever been able to explain this, but animals are capable of transforming plant matter with a very low nitrogen content into manure with a fairly high nitrogen content in a matter of hours. Keeping animals in your garden is extremely good for your soil and your vegetables. If you have animals, or if you can import animal manure from elsewhere, you will never be short of fixed nitrogen to feed your crops.

There are some important facts about the nitrogen cycle that gardeners need to know. First, all dead animal or vegetable tissue put in or on the soil will eventually release its nitrogen for the use of plants. But, and this is of great importance, it may do so very slowly, because of what is called the nitrogen/carbon ratio. If there is not enough nitrogen to balance the carbon which forms a large part of the body of every living organism, the putrefactive bacteria, which break down organic matter and release nitrates for the higher plants to use, will have to borrow nitrogen that is already in the soil. This means that, temporarily, they will rob the soil of nitrogen. However, eventually they

THE NITROGEN CYCLE

The power in a flash of lightning can fix nitrogen – take it from the air and leave it in the soil in a compound form which can be absorbed by plants. More often nitrogen is fixed by bacteria in the soil, some of which live in nodules on the roots of leguminous plants. Plants turn nitrogen into protein. Animals eat plants and produce more complex protein. Animal waste and the dead bodies of plants and animals return the protein to the soil. Bacteria work on this protein, once again producing nitrogen compounds which will feed plants, and nitrogen which returns to the air.

will complete their work and release into the soil the nitrogen they have borrowed, and also the nitrogen they have got from the organic matter they have eaten.

Now, in practice this means that if you dig or plow in material which is low in nitrogen, such as straw, sawdust, or plants which have already gone to seed, you should either put some highly nitrogenous substance in with it to feed the bacteria which are to break them down, or else be prepared to wait a long time before that soil is again very fertile. Leguminous plants like alfalfa or clover, turned into the soil before they have flowered, are sufficiently high in nitrogen to break down almost immediately and release their nitrogen in a matter of a very few weeks – the warmer the weather, the quicker the process. Straw from sweet corn, and old plant residues that have seeded, will take a year or even two.

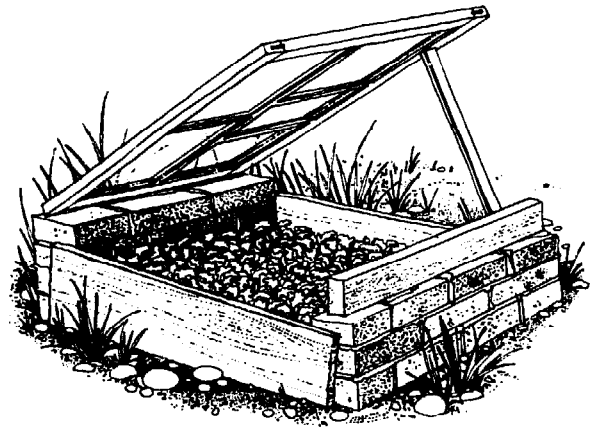
One lesson to be learned from this is: only dig in green manure crops if they are young and succulent. If any plant has already seeded, which means that most of its nitrogen has gone into its seed, put it on your compost heap. This is the value of your compost heap: it rots down organic matter, so that the matter can give its fixed nitrogen back to the soil, without robbing the soil in the process. This is why extra nitrogen, ideally in the form of animal manure, should be added to the material in your compost heap to help the rotting process. Organic matter will rot down in your compost heap even if you don't give it more nitrogen, but the process will take a long time.

The other lesson that the nitrogen cycle teaches is that a gardener should grow as many plants that belong to the family *Leguminosae*, the pea and bean family, as he can. As I have explained, the members of this family have nodules on their roots containing bacteria which fix nitrogen. Quite apart from this, leguminous plants are extremely nutritious and very high in protein. In fact it would be difficult on an all-vegetable diet to live without them: the "pulses", as the seeds of peas and beans are called, are the best form of vegetable protein you can get.

THE SOIL

A spadeful of soil may look a very simple, innocuous substance. But it is, in fact, of such enormous complexity that it is doubtful if mankind will ever fully understand it. First of all, if it is good soil, it is filled with life. In every teaspoonful of soil there are millions of bacteria – bacteria of numerous species as well as algae, microscopic animals, the mycelium of fungi, and viruses. In larger quantities of good soil you are sure to find worms and the larvae of numerous beetles and other insects. It has been calculated that there are from five to ten tons of living matter in every acre of soil.

The interrelationships of these various animals and plants are of great complexity. There are long and involved food chains, and subtle mutually beneficial arrangements. There are chemical processes of such complexity that no scientist has ever been able to duplicate them in his laboratory. For example, there are five species of bacteria that we know of which can fix nitrogen from the air and convert it into the type of amino acid which can



make protein for plants and ultimately people. Two other species of bacteria have the baleful effect of turning useful nitrites and nitrates, that could have been used by plants, into free nitrogen gas again; three species can turn ammonia into nitrites; another can turn nitrites into nitrates which plants can use; and a huge array of bacteria, fungi and actinomycetes turn protein and other dead organic matter into ammonia. That simple spadeful of soil is a chemical factory of a sophistication that no human chemist has ever been able even to approach.

The origins of soil

Fundamentally, soil is rock that has been pulverized by such agents as heat and cold, water and wind, and, very importantly, has been subjected to the eroding effect of lichens, bacteria, algae and other living creatures. The hardest rock in the world, as long as it is exposed to light, is being gradually gnawed away by plant life.

For the purposes of the gardener, although a geologist might disapprove, it is enough to say that most of the land surface of the Earth consists of a layer of soil lying on top of rock. Between

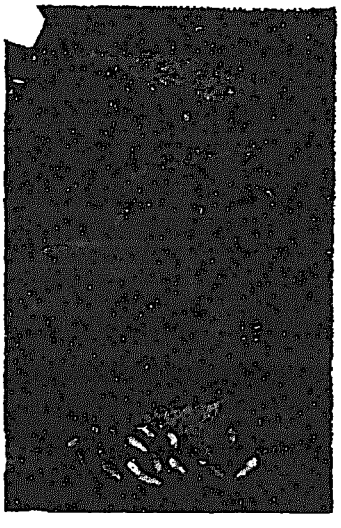
The Ecology of the Soil

All terrestrial life comes from the soil and returns to it. And all terrestrial death comes to life again through the soil, because decomposing organic matter contains nearly all the nutrients that plants require. The good gardener will respect this natural cycle and thereby ensure that the soil in his garden is always living and life-giving.

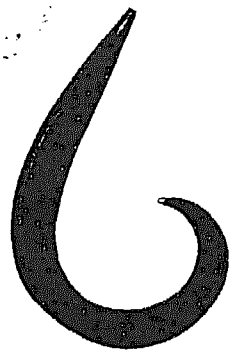
SOIL LAYERS *Every soil can be divided into three distinct layers: topsoil, which in a fertile soil is rich in humus (decayed organic matter); subsoil, which is composed mostly of rock particles; and rock from which the layers of all soil is formed. Minerals are found in all layers.*

PLANTS *The roots of different plants and trees push outward and downward to varying extents. Where many species grow together nourishment is drawn from all layers of the soil through their roots.*

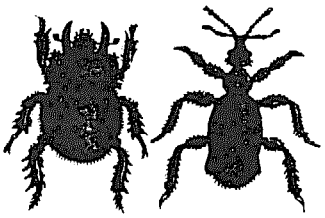
ANIMALS *The complexity and interaction of animal life in the soil performs two crucial functions: the breaking down and returning to the soil of organic matter; and the aeration and loosening of the soil which enables roots to spread deep and wide, and oxygen, nitrogen, rainwater and other useful elements to penetrate deep down. It is the delicate balance between a myriad species which keeps soil healthy, productive and free from disease.*



ANT NEST *The building of an ant nest aerates the soil, but it may kill the plant above.*



WORMS *Worms perform the vital job of dragging dead organic matter down into the soil, but some of them, like the eel worm, above, attack, and sometimes kill, the roots of vegetables.*

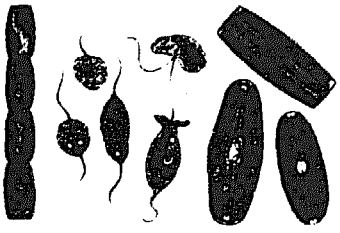


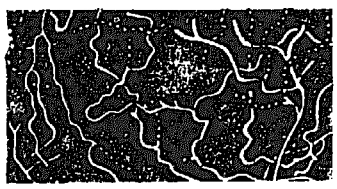
INSECTS *Insects do the essential work of aerating the soil. Living organisms in the soil produce carbon dioxide and this would build up to a poisonous level if the tunneling of insects did not allow it to escape. Aeration permits oxygen to penetrate the soil and this is necessary for the good health of living organisms and plant roots, and also the decaying processes which produce humus.*

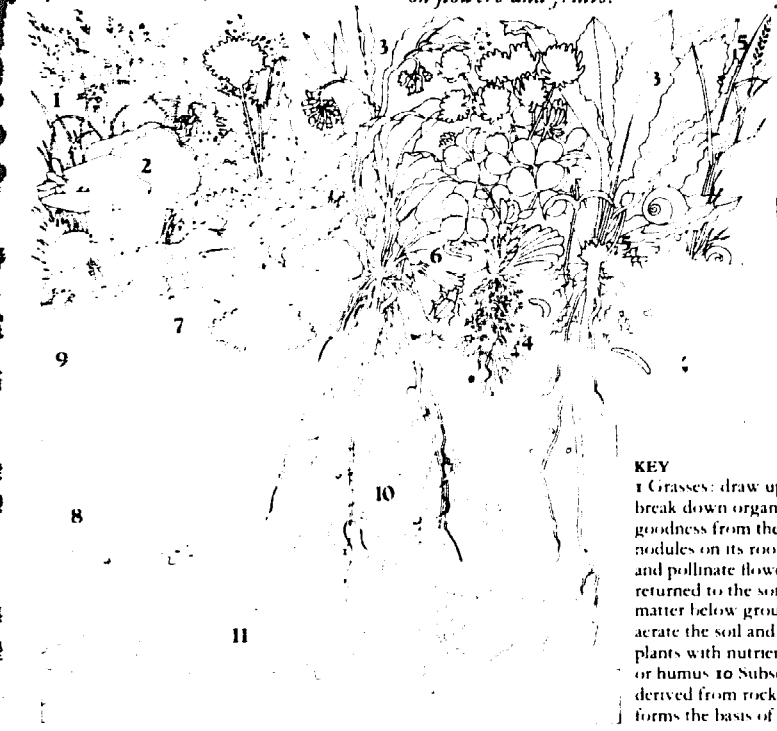
BACTERIA *Bacteria perform a variety of vital functions in the soil. The bacteria pictured here, take nitrogen from the air and put it into the soil.*

FUNGI AND ALGAE *Fungi, above, and algae, below, are present in all soils. Once the larger animals have helped reduce dead organic matter to humus, the fungi and algae take over to release nutrients from the humus that can be used by plants. It is thought to be actinomyces (a cross between a fungus and a bacterium) that gives soil its smell. Its mycelia (root-like growths) are shown, bottom.*

YEASTS *Yeasts are unicellular fungi which turn sugar into alcohol and carbon dioxide. They will be found above ground feeding on flowers and fruits.*





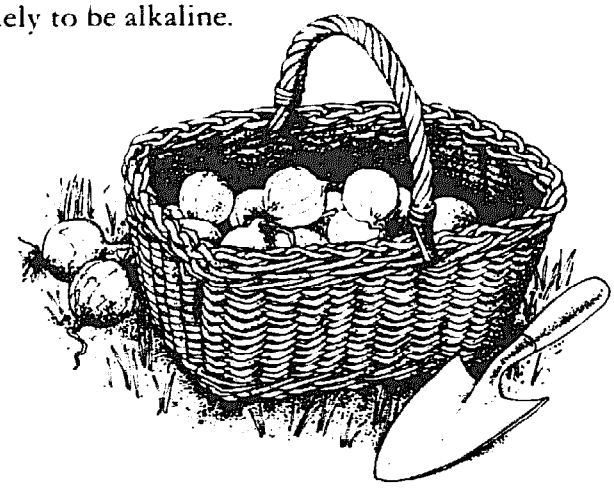


KEY
1 Grasses: draw up goodness from the topsoil **2** Fungi: break down organic matter **3** Comfrey and dock: draw up goodness from the subsoil **4** Clover: fixes nitrogen with nodules on its roots **5** Insects: break down organic matter and pollinate flowers **6** Dead creatures: decompose and are returned to the soil **7** Worms and beetles: drag organic matter below ground **8** Burrowing animals: break up and aerate the soil and eat insects and grubs **9** Topsoil: supplies plants with nutrients derived from decaying organic matter, or humus **10** Subsoil: supplies plants with minerals – some derived from rock, others washed down by rain **11** Rock: forms the basis of all soil

the two is an intermediate layer known as subsoil, which is rock in the process of being broken down by natural forces. Some soils are the direct products of the rock underneath them; others were brought to where they are by other forces. They may have blown there, like the loess soils of North America and China, been carried there by glaciers, like much of the soil in North America and much of the soil north of the Thames in Britain, or been washed there by water, like many soils in river valleys.

Types of soil

To the practical gardener the origin of his soil is of interest, but not vitally important. What is important to the gardener is the nature of his soil, wherever it came from: whether it is light, meaning composed of large particles like sand; heavy, meaning composed of very small particles like clay; or something in between. It is important to know: whether it is that rare commodity, organic soil, which means it is composed of decaying vegetable matter; whether it is acid or alkaline sand is inclined to be acid, clay alkaline; whether it is naturally well drained or not; what lies underneath it – soil above chalk or limestone is very likely to be alkaline.



Fortunately, whatever your soil is like, you can improve it. There is scarcely a soil in the world that will not grow good crops of some sort if it is properly treated. Excess acidity is easily remedied by adding lime; excess alkalinity by adding compost or manure. Waterlogging can always be cured by drainage. Trace element deficiencies can be cured simply by adding the missing trace elements.

Humus

Above all, everything about your soil can be improved by the addition of one thing: humus. Humus is vegetable or animal matter which has died and been changed by the action of soil organisms into a complex organic substance which becomes part of the soil. Any animal or vegetable material, when it dies, can become humus.

Humus has many beneficial effects on the soil. All the following have been established experimentally by soil scientists – they are not just the optimistic conjectures of a humus-enthusiast: humus protects soil from erosion by rain and allows water to percolate gently and deeply; it reduces erosion by wind; its slimes and gums stick soil particles together and thus turn a very fine soil, or clay, into a coarser one; it feeds earthworms and other useful soil organisms; it lowers soil temperature in summer and increases it in winter; it supplies nutrients to plants, because it contains all the elements that plants need and releases them slowly at a pace that the plant can cope with; it enables the soil to hold water like a sponge, and minimizes the loss of water by evaporation; it ensures that chemical changes are not too rapid when lime and inorganic fertilizers are added to the soil; it releases organic acids which help to neutralize alkaline soils, and help to release minerals from the soil making them available to plants; it holds the ammonia and other forms of nitrogen in the soil in an exchangeable and available form – without it nitrogen is lost quickly because of the action of denitrifying bacteria; it keeps down many fungal diseases and the notorious eel worm.

Clearly one of your main aims as a gardener should be to increase the humus content of your soil as much as possible. Soils ranging from the heaviest clay to the purest sand can be improved and rendered fertile by the introduction of sufficient humus. There is no soil that does not benefit from it, and there is no crop, that I know of, that is not improved by it.

Now, any organic material that you put into the soil will produce humus. Compost, green manure, farmyard manure, peat, leaf-mold, seaweed, crop residues: anything that has lived before can live again. Bury it in the soil and it will rot and make humus. Leave it on top of the soil; it will rot, the worms will drag it down deep under the soil and it will still make humus.

Humus is the firm basis of good gardening. It is possible to grow inferior crops on humus-deficient soil by supplying all your plants' chemical requirements, mainly in the form of nitrates, out of a fertilizer bag, but if you do this your soil will progressively deteriorate and, ultimately, blow or wash away, as the topsoils of so much of the world's surface, abused by mankind, already have.

CHAPTER ONE

The Illustrated Index of Vegetables, Fruits and Herbs

Containing the edible roots, stems, leaves, flowers, seeds, pods and fruits that constitute the produce of the kitchen garden.

The Edible Parts of Plants

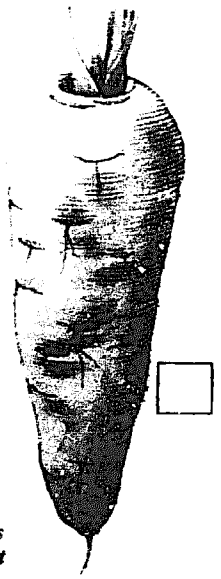
I was once extremely hungry in a jungle and almost overwhelmed by plant life. However, I could not find a single edible plant. I was made to realize that for human beings few of the thousands of plants that grow on this planet are edible. Most of them are far too tough. Humans cannot digest cellulose which is the basis of much plant tissue. Of the comparatively few plants that humans can eat, most are only edible in part. The larger and more complex edible plants have, just like animals, evolved separate and specialized organs which are quite different from each other and which serve quite different purposes. We, and other herbivorous and omnivorous animals, eat different parts of different plants, on the basis of what tastes best and does us good.

For the purposes of the gardener the main parts of plants can be classified as: roots, stems, leaves, flowers, fruit and seed. Most plants have all of these parts. There are some oddities that don't, like cacti which don't have leaves – their stems serve instead. The tissues of which the various organs are composed are different in kind, and the botanist can tell, quite easily, whether an organ is, for example, a stem or a root. The non-botanist is in for a few surprises. This is because some plants have developed some of their organs for very particular purposes – storing nourishment through the winter, for example – and the resulting organ is often a unique and strange-seeming example of its type.

Many of the plants we eat, particularly root and stem vegetables, are naturally biennial. The plant uses a swollen root or stem to store in its first year of growth much of the energy which it will use in its second year to produce flowers and seeds. Gardeners harvest these biennial plants after their first year of growth, so as to get the full benefit of this stored up nourishment before it is dissipated. This is why lettuces should not be allowed to "bolt", and why many vegetables should not be permitted to go to seed. If you leave a beet or carrot, for example, in the ground for more than one year, the edible roots will become tough, and shrink as the energy stored in them is used to make the plants flower.

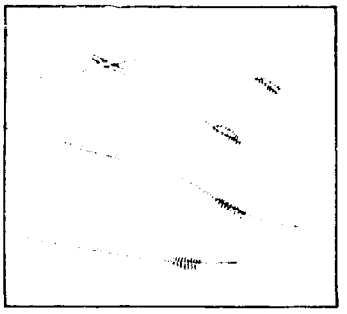
Roots

When analyzing plants it seems sensible to start at the bottom, with roots. Most roots have the specialized function of absorbing from the soil the non-organic nutrients that plants need to grow and survive. These include: water, in which all the other nutrients have to be dissolved; nitrogen; potash; phosphates; and all the many trace elements which are essential to plants. Roots force themselves far down into the soil in their search for water and nutrients. Fortunately for humans, some plants also use their roots for storing food as well as gathering it. Gardeners are able to harvest this stored food to keep themselves going in the lean times of winter or drought.



Swollen tap root

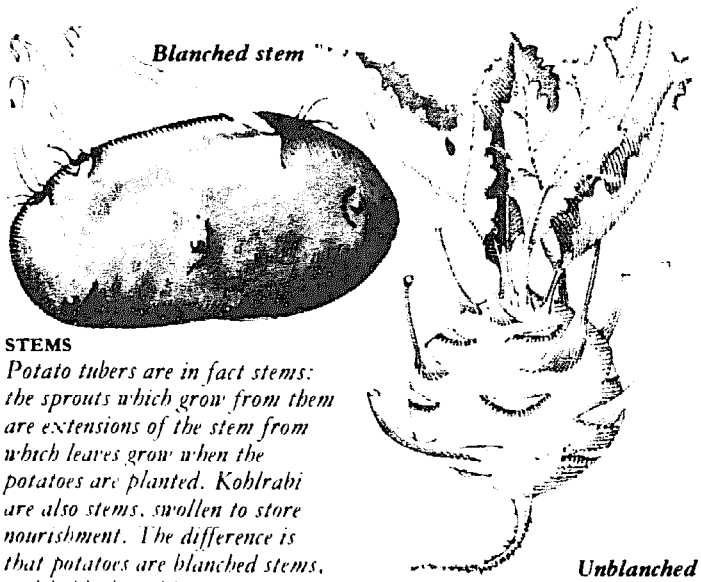
ROOTS
Most edible roots are swollen tap roots. Laterals, or side roots, grow from the tap root; and toward the ends of these are the microscopic root hairs which feed the plant by absorbing moisture and nutrients from the soil.



Edible roots are nearly all tap roots. A tap root is the main support root of the plant, out of which grow the searching side roots and their absorbent root hairs. A number of common vegetables are swollen tap roots. These include carrots, parsnips, radishes, rutabagas, turnips and beet. Red beet is the beet that is eaten: sugar beet stores the plant's energy in the form of sugar and is grown commercially for that very reason. Most plant energy is stored in the form of starch, but energy can only be transported about a plant in the form of sugar. This is because starch is not soluble. This fact is important to the gardener. If you want the sweetness of certain vegetables – new potatoes and sweet corn are cases in point – you must harvest the crop when the energy is still in the form of sugar and not wait until the plants grow older and the sugar has been stored away as starch. If you make wine, you will find that you need certain enzymes to turn the starch into sugar, for only sugar, and not starch, can be turned into alcohol by yeast.

Stems

There are some very unusual stems. Potatoes, for example, although they grow underground and are swollen to store food, are not roots but stems.



STEMS
Potato tubers are in fact stems: the sprouts which grow from them are extensions of the stem from which leaves grow when the potatoes are planted. Kohlrabi are also stems, swollen to store nourishment. The difference is that potatoes are blanched stems, and kohlrabi unblanched.

Potatoes have all the morphological characteristics of stems. They don't put off lateral roots and the "eyes" in them are in fact growth buds from which normal stems and leaves develop when the potatoes are planted below ground. Exposed to the light potatoes immediately develop chlorophyll – turn green – as most stems do, so that they can engage in photosynthesis.

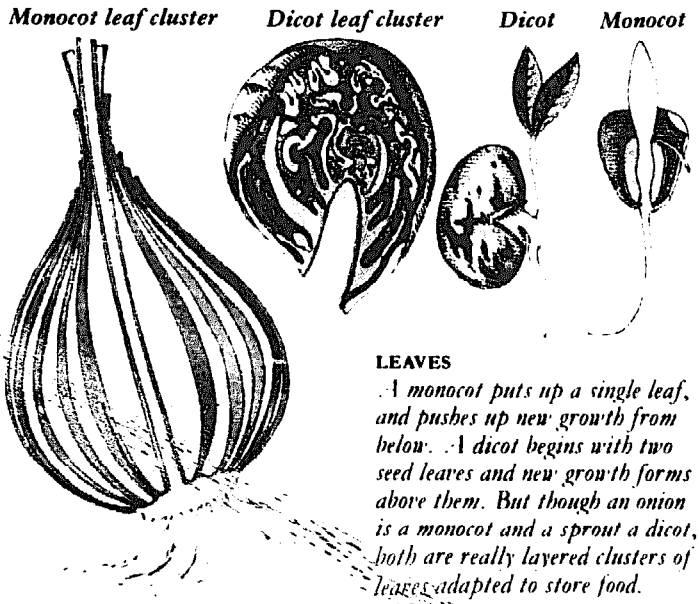
Photosynthesis is not only the very basis and mainspring of the gardener's art, but it is the one process that keeps every single living being, animal or vegetable, alive on this planet. It is the miraculous process – no scientist has ever been able to duplicate it – that uses the energies of the sun to make carbohydrate or starch, which is the basis of all plant and animal energy. Photosynthesis is carried out by chlorophyll – the green matter of plants – and in the total absence of light no green plant can live. Non-green plants, like fungi, only live as parasites or saprophytes on the living or dead tissue of other organisms. They lack chlorophyll and cannot derive their energy from the sun.

Many stems are very tough – consider the stem of an oak tree – because they have to support the upper parts of the plant in the air. Some stems are pleasant for us to eat only if they are blanched, that is kept from the light so they do not develop chlorophyll and stay white instead of turning green. Potatoes are like this, and so are celery stems, seakale and chards, which are the stems of cardoons. The stem is the edible part of a rhubarb plant: the leaves are actually poisonous. Kohlrabi and celeriac are both stems, swollen so that they can store food. Notice the leaf buds and the scars left by leaves on the stems of kohlrabi.

Leaves

Leaves are often edible, and some of them have evolved to become storehouses of energy, just like the specialized roots and stems. For example, onions, leeks, garlic and shallots are really layered clusters of leaf bases adapted to store food throughout the winter. The leaves of hearted cabbages behave in much the same way, and other plants, like lettuces, are halfway along this line of evolution: toward tight clumps of leaves which store energy through the winter, so that, if you allow it to, the plant gets away the second year to produce a flowering head and early seed.

"Monocots" and "dicots" All plants are either monocotyledons (monocots) or dicotyledons (dicots). The difference lies in the seed, the leaves and the mode of growth. The seed of a dicot – a bean, for example – is made up of two halves. You can see this for yourself: a broad bean will readily split in two if you just press into it with your fingernail. A monocot seed, on the other hand, is self-contained and cannot be split.



LEAVES
A monocot puts up a single leaf, and pushes up new growth from below. A dicot begins with two seed leaves and new growth forms above them. But though an onion is a monocot and a sprout a dicot, both are really layered clusters of leaves adapted to store food.

Dicots produce two seed leaves. Thereafter the stem grows upward and new leaves issue from a growing point at its tip, or from growing points at the tips of branches. Monocots grow in a completely different way. They begin by pushing up a single leaf – a blade of grass or an onion is a good example. Thereafter they continue to grow by pushing from the seed upward. The first leaf is pushed up and to one side and new ones push their way up beside it. Dicots add new growth above existing growth, while monocots push existing growth upward adding new growth beneath it. Most vegetables are dicots, but some notably

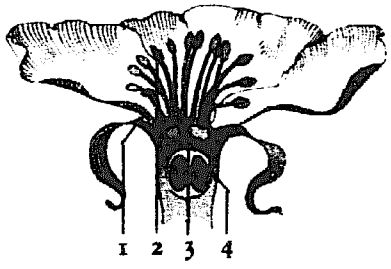
onions, leeks, asparagus and sweet corn, are monocots. An easy way to distinguish between the two is to look at the leaves. If they have almost parallel veins, the chances are they are monocots, but if the veins of the leaves splay out away from each other, they are almost certainly dicots.

Flowers

Flowers are the next step upward in a plant, and they are not as a rule an important food for humans. But they are important to the plant, of course, for they ensure its posterity.

Sex reared its beautiful head in a new and elaborate form millions of years ago in the Jurassic Age, when insects and plants developed their amazing symbiosis. The plants provide nectar and other delights to attract the insects, and the insects unwittingly cross-fertilize the plants by going from one to the other carrying pollen, from the male organs of one flower to the female organ of another. The extraordinary elaboration of devices to attract the right insects, and ensure that they collect pollen on their bodies, and do not self fertilize the flower they are visiting, but instead fertilize the next flower, has been the life study of many botanists, including, notably, Charles Darwin. It is a very good thing to keep bees – particularly if you have fruit trees, for not only do you get honey from them but they pollinate your trees and flowering plants.

Some flowers are pollinated by the wind. Corn is one of them, and because of this you should plant your sweet corn in a wide block and not in one long row. You must try to make sure that when a wind blows from any direction it blows pollen from one plant to another.



FLOWERS
Flowers are essential to the reproduction of plants. Their nectar 1 *attracts insects who pick up pollen from the male part* 2 *of one plant and carry it to the female part* 3 *of the next. The ovary* 4 *of a flower after it has been fertilized is the fruit.*

There are not many flowers which are edible. The main ones are cauliflower and broccoli, which are immature flowers. If you leave these to continue growing instead of eating them, they will produce inedible mature flowers, just as an abandoned cabbage will. Globe artichokes are flowers, although only a small part is actually edible. Nasturtium seeds make good substitutes for capers, and some herb flowers are good for flavoring and coloring. But, if you had to live exclusively on flowers, you would get very thin indeed. Seed and fruit, which come from the reproductive part of flowers are more important to the self-sufficient gardener.

When the female element of a flower has been pollinated the flower forms a fruit. The fruit grows and produces seed within it. The seed is spread far and wide by a number of amazingly ingenious methods which plants have evolved so as to propagate their species. A gardener who wishes to enjoy his craft will study all these things, for a knowledge of them will increase enormously the pleasure he gets from his labors. The more you learn about plants, the more you will wonder at the extraordinary cunning and elaboration that selection has evolved for their survival and perpetuation.

Fruits

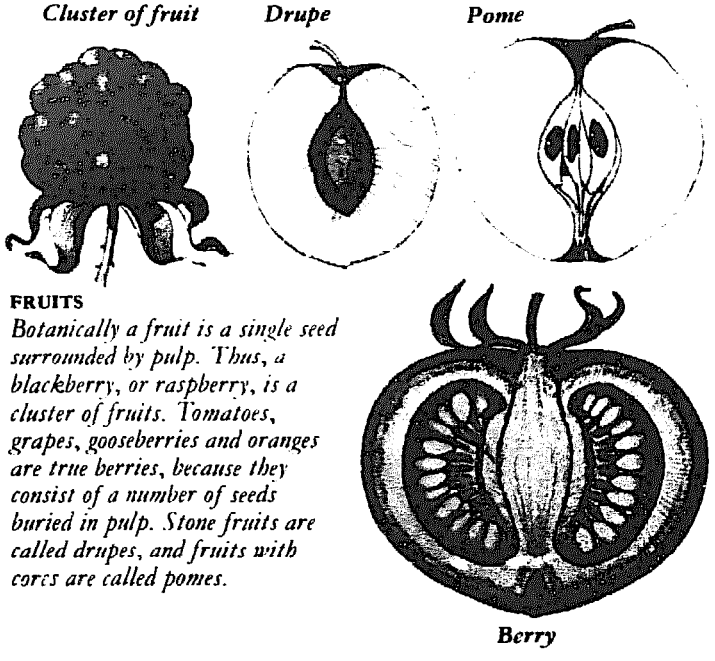
To a botanist, fruit is the ovary of a flower after it has been fertilized. Fertilization causes the ovules, which are inside the ovary, to turn into seeds and the ovary itself to turn into a fruit. Some fruits don't bear much resemblance to what a storekeeper would call fruit. A whiff of dandelion fluff is a fruit, and so are all nuts. Tomatoes, eggplants, peppers, beans and pods full of peas are all fruits; an individual pea and a bean threshed from its pod for drying are seeds.

To a cook and a gastronome, and to most people in fact, fruit means the sort of sweet succulent fruit which is eaten as a dessert. I have used this common classification in ordering this book. The only exception I have made is rhubarb, which though eaten as a dessert is not naturally sweet and is grown like a vegetable, which in fact it is.

Botanically a blackberry or raspberry is not one fruit but a cluster of fruits. Each tiny globe that goes to make up such a "berry" is a complete fruit. The word berry means something different to a botanist. A tomato is a true berry, because its seeds are embedded in soft pulp. Grapes, gooseberries and oranges are also berries. The fruits which contain single stones – plums, cherries and peaches – are called drupes. Fruits like apples and pears are called pomes. Only the core of a pome is a cluster of true fruits; the edible part surrounding the core is just a layer of stored food. Each tiny pip in a strawberry is a single fruit. They are all held together by a succulent mass. If you take the trouble to cut open pomes, berries and drupes at various stages of their growth you will see how all this works. Every part of the fruit is in embryo in

the flower and you can follow the development of each part of the flower as it becomes a fruit.

Generally speaking, fruits contain little nourishment, and most of the little they have is in the form of sugar. All the stored energy of the plant is going to go into the seed, not the fruit. If you tried to live on fruits alone, you would soon become seriously undernourished. Fruits tend to be rich in certain vitamins, however, particularly vitamin C, and this makes them valuable to humans. Many years ago a learned doctor said: "Apples have no nutritive value whatever and it does not matter whether you eat them or not." He was completely mistaken, but then he did not know about vitamins. William Cobbett made the same mistake when advising his cottagers not to grow fruit trees. He thought they were good for nothing but giving children belly-aches.



FRUITS
Botanically a fruit is a single seed surrounded by pulp. Thus, a blackberry, or raspberry, is a cluster of fruits. Tomatoes, grapes, gooseberries and oranges are true berries, because they consist of a number of seeds buried in pulp. Stone fruits are called drupes, and fruits with cores are called pomes.

All the members of the squash tribe are fruits. Some, like melons, seem to have developed their large, water-filled fruit so that they can store water. They come from parts of the world with short rainy seasons. The stored water gives the seeds a head start – one good watering – to enable them to stay alive until the next rains. Other fruits have undoubtedly developed to attract animals. Apples, plums, peaches and cherries have all evolved in this way. Man has taken many of these slightly succulent and somewhat sour wild fruits and, by artificial selection, evolved improved varieties, containing a lot of sugar, extra flavor, plenty of succulent flesh, and not too much acid. If you compare the wild crab apple with a Golden Delicious you will understand what has happened. Most cultivated fruits have been improved out of recognition.

Seeds

If it were not for edible seeds humans could scarcely survive. Some seeds have to pass through the guts of an animal in order to germinate. So it is important for plants that their fruit should be eaten. Many seeds are not strictly edible; humans eat them but they pass through them intact without doing them any good. It is the fruit that they benefit from.

Other seeds, especially the cereals, such as wheat, rice and corn, are eaten for direct nutrition and it is these seeds that keep humanity alive in many parts of the globe. Before an annual plant dies it puts all the nourishment it has into its seeds, which are to carry its life on into future generations. Thus seeds are generally far more nutritious than any other parts of plants and, if you grind them or cook them and make them palatable, they will give you the energy to keep alive. Without seeds a vegetarian would live on a very sparse diet indeed: it would be scarcely adequate to sustain life.

Seeds of certain plants, notably leguminous ones, are quite rich in protein. Pea and bean seeds of all kinds are very important. A vegetarian can enjoy a near perfect diet if he eats plenty of soybeans, some other vegetables and a little comfrey, which is almost the only edible plant that contains vitamin B12. The great thing about seeds is that they are easy to dry and store.

Herbs

Many herb seeds are used to flavor food, for the essential oils and other virtues of herbs are often concentrated in their seeds. Many of the more aromatic herbs come from dry warm regions. Their aromatic oils have evolved largely to protect them from over-dessication in dry hot weather. The small leaves of many of them – often mere needles – are that size and shape to prevent moisture being transpired by the plant too fast.

Some of the delicious flavors and aromas of culinary herbs are there for reasons that are not fully understood yet: attracting and repelling various insects may well be one of them. But plants are endlessly fascinating and mysterious, and happily it is improbable that we will ever know all there is to know about them. It should be enough for us that thyme and rosemary smell and taste as they do, without worrying why.

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RUTABAGAS
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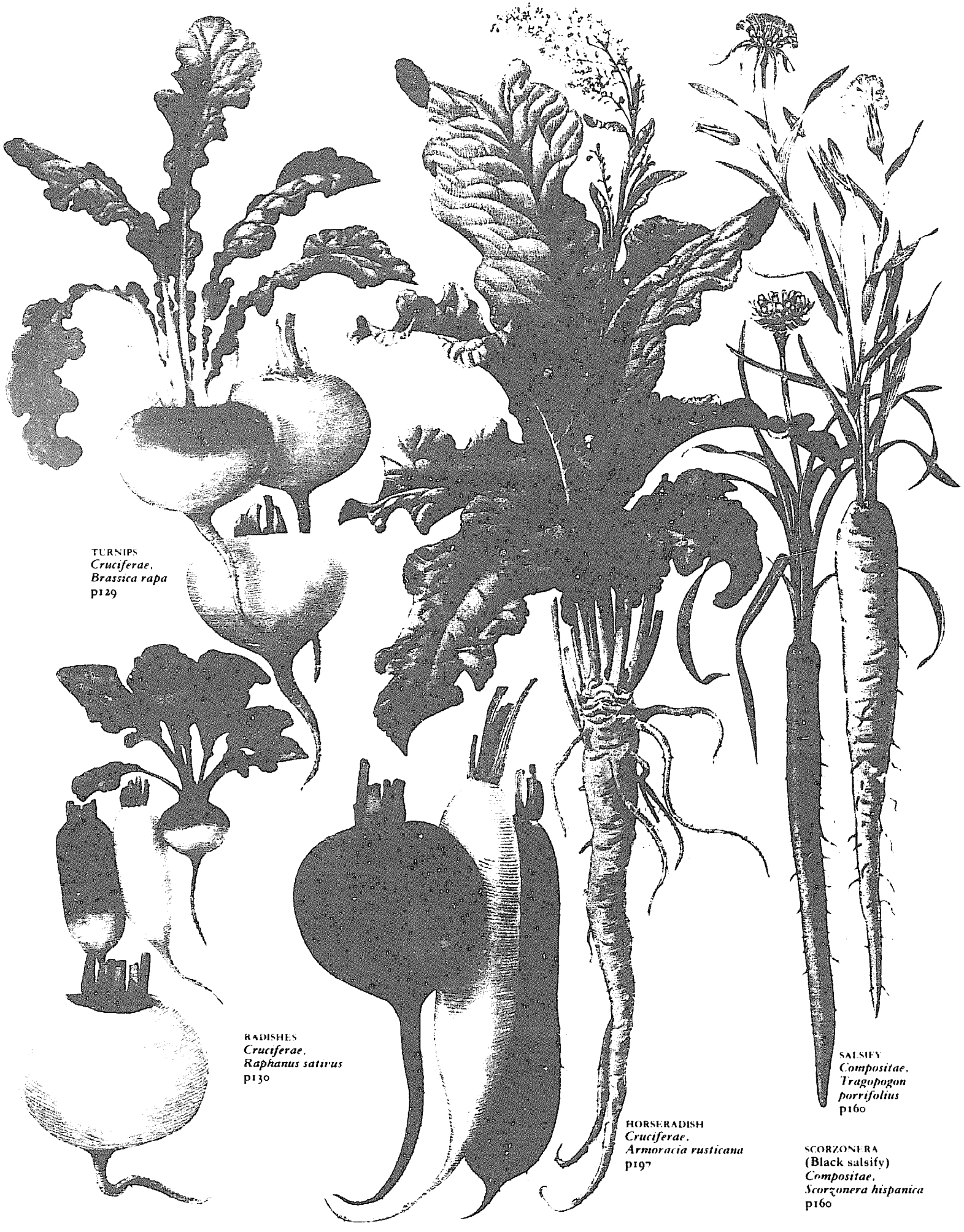

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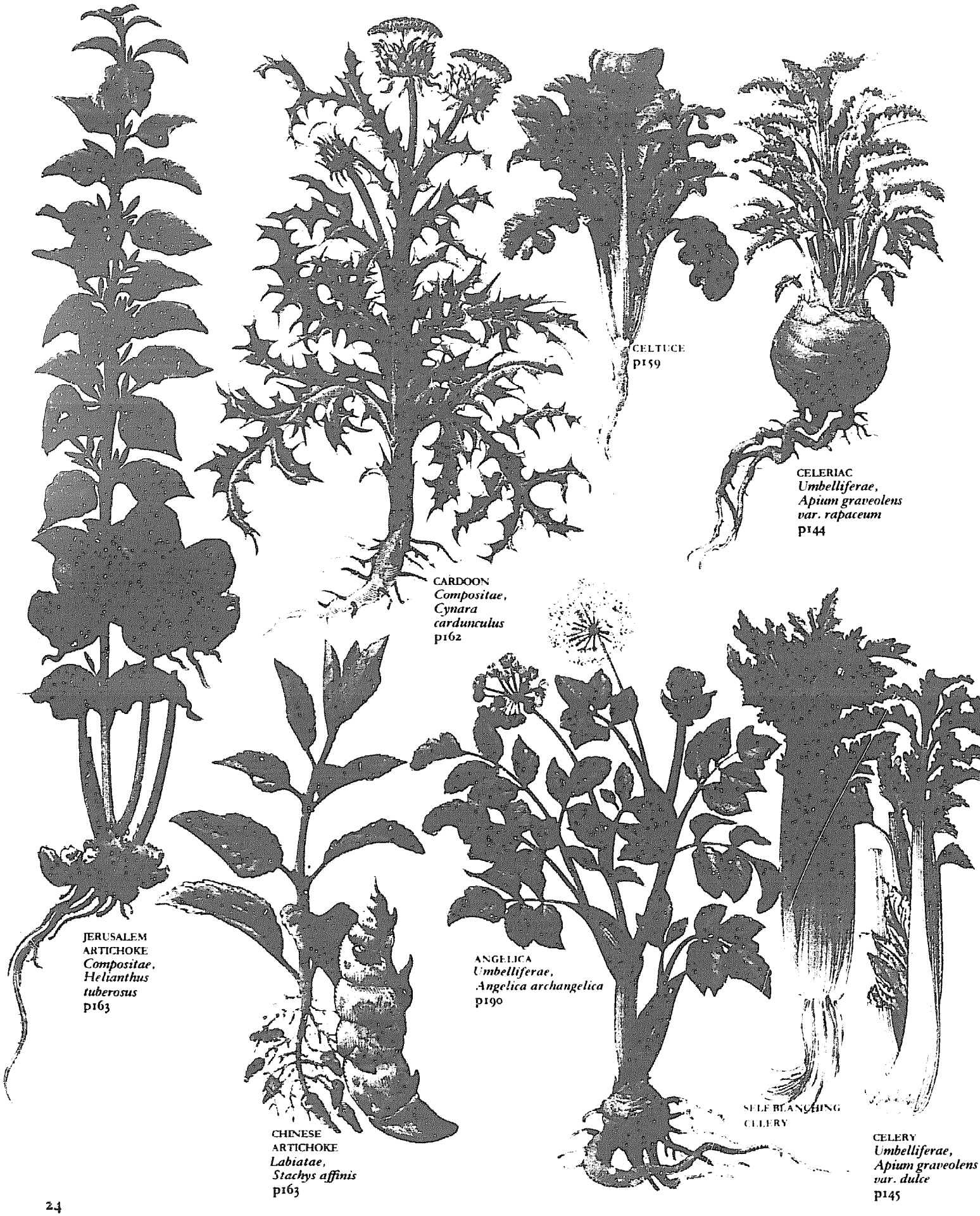

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CELERY
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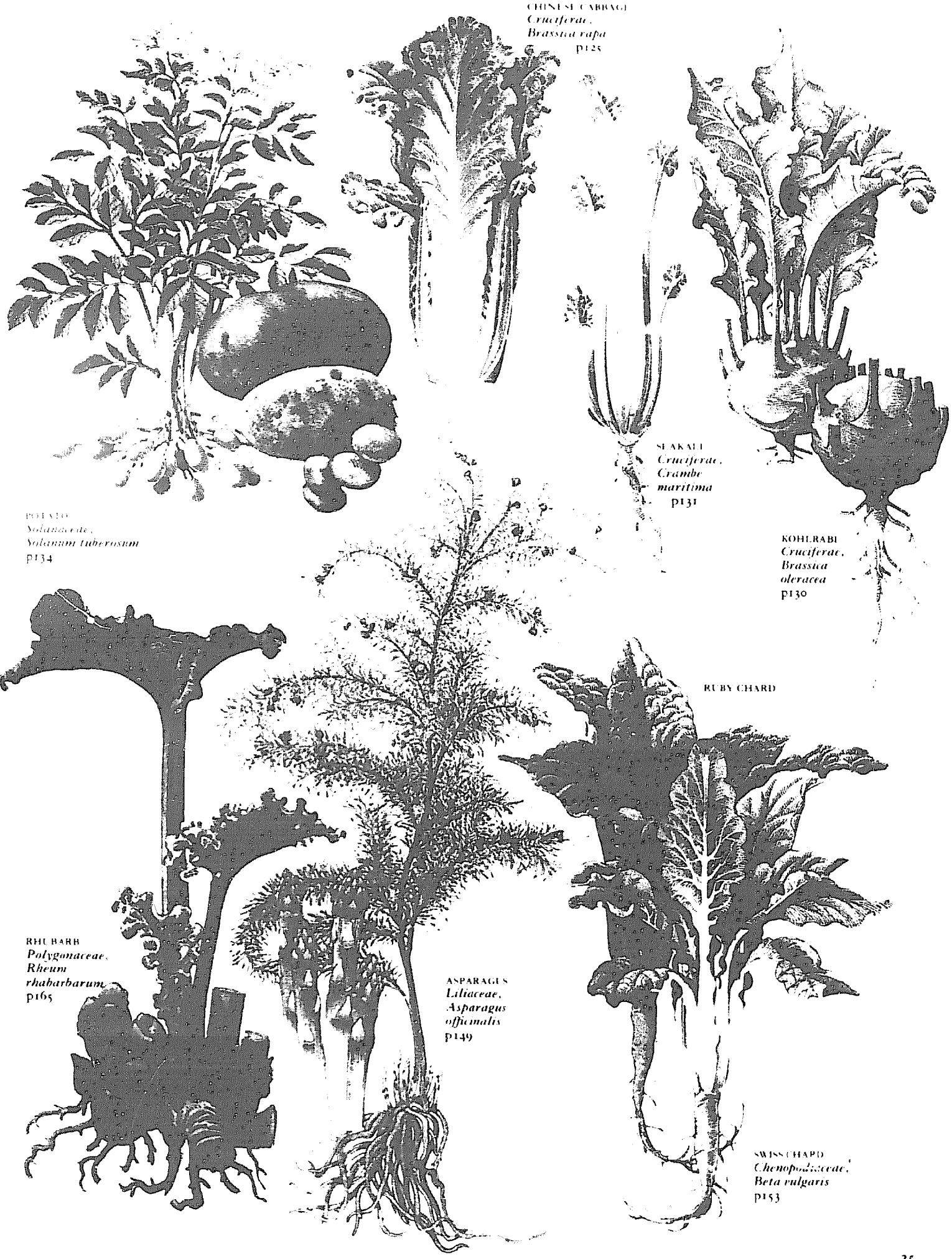

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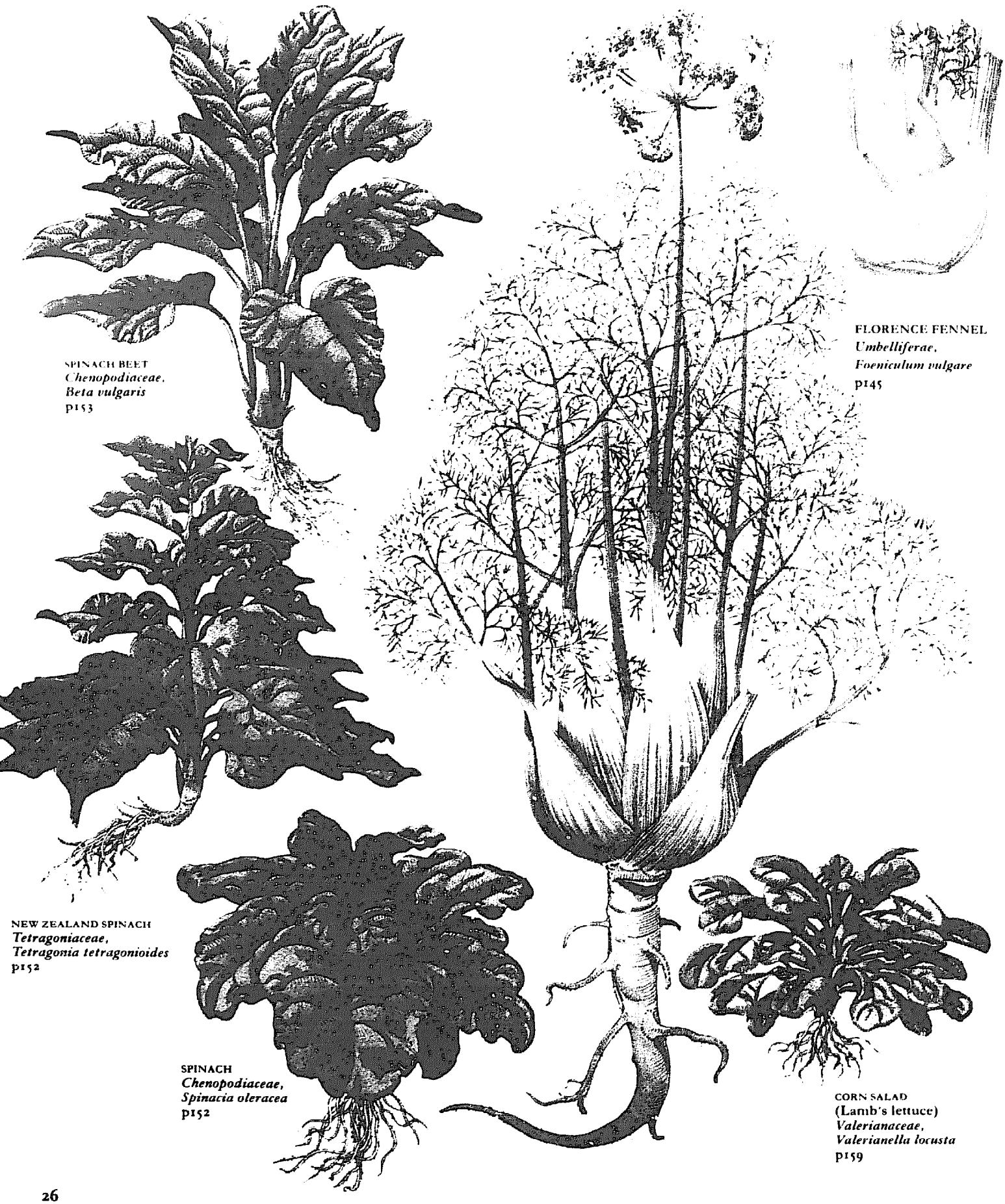

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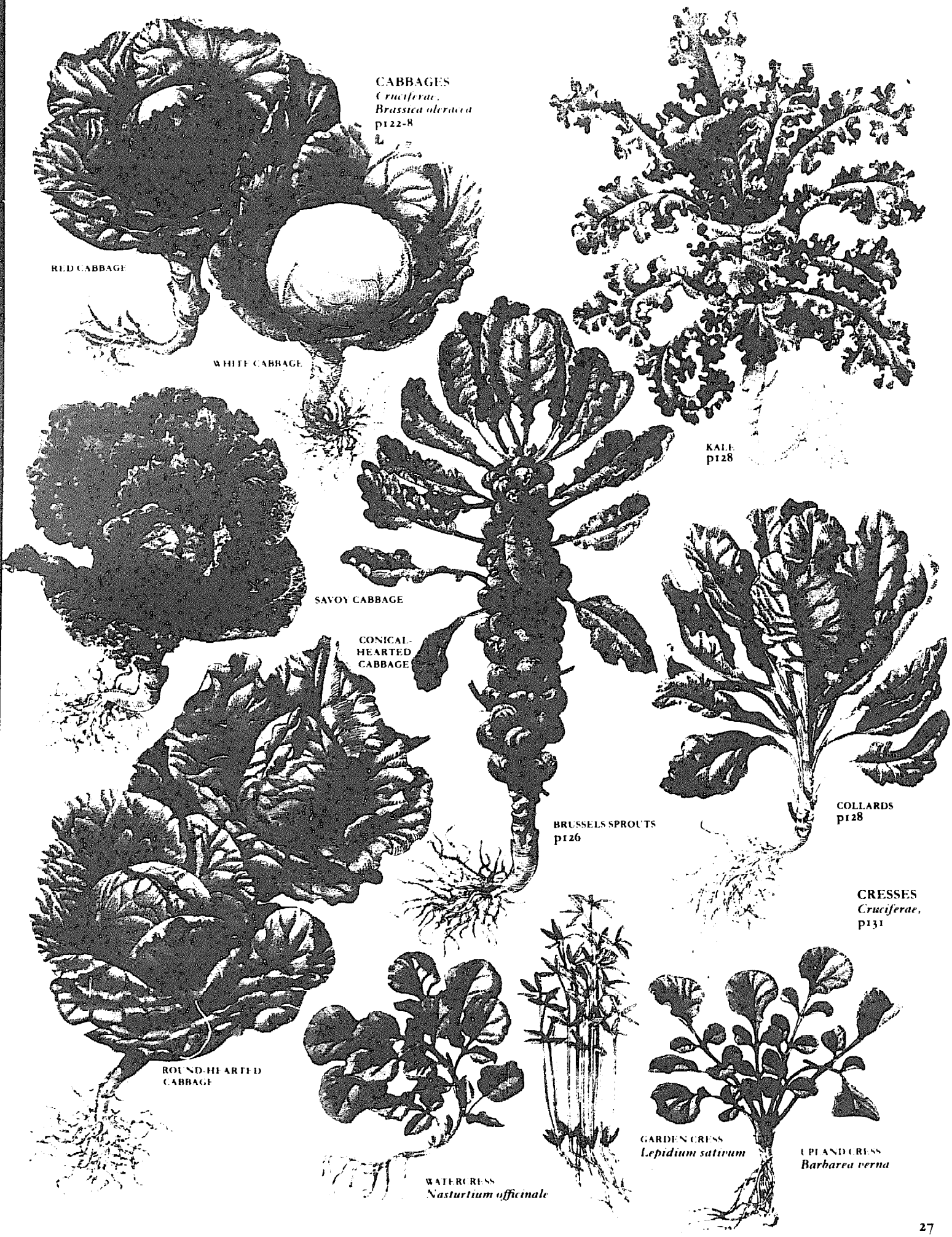

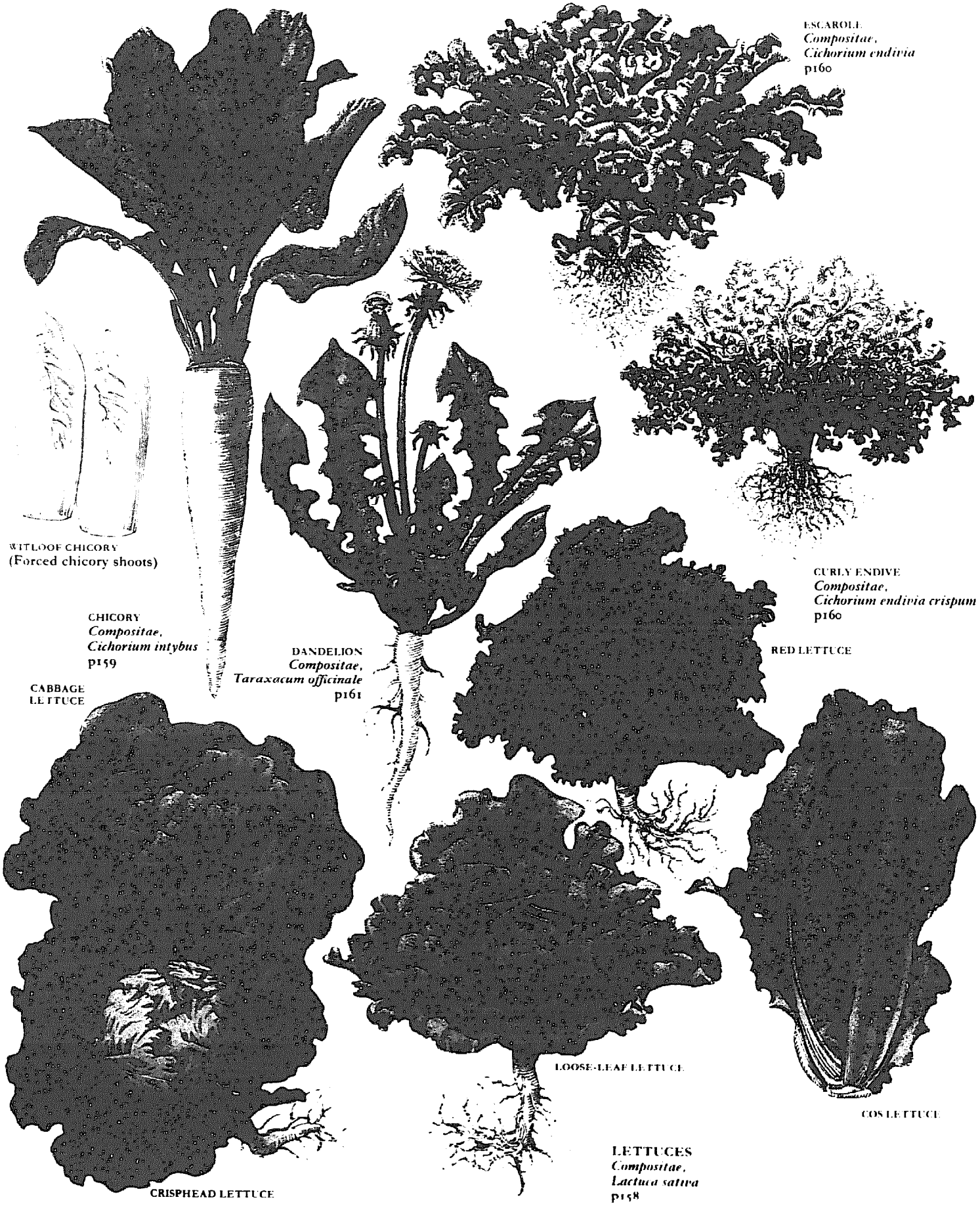

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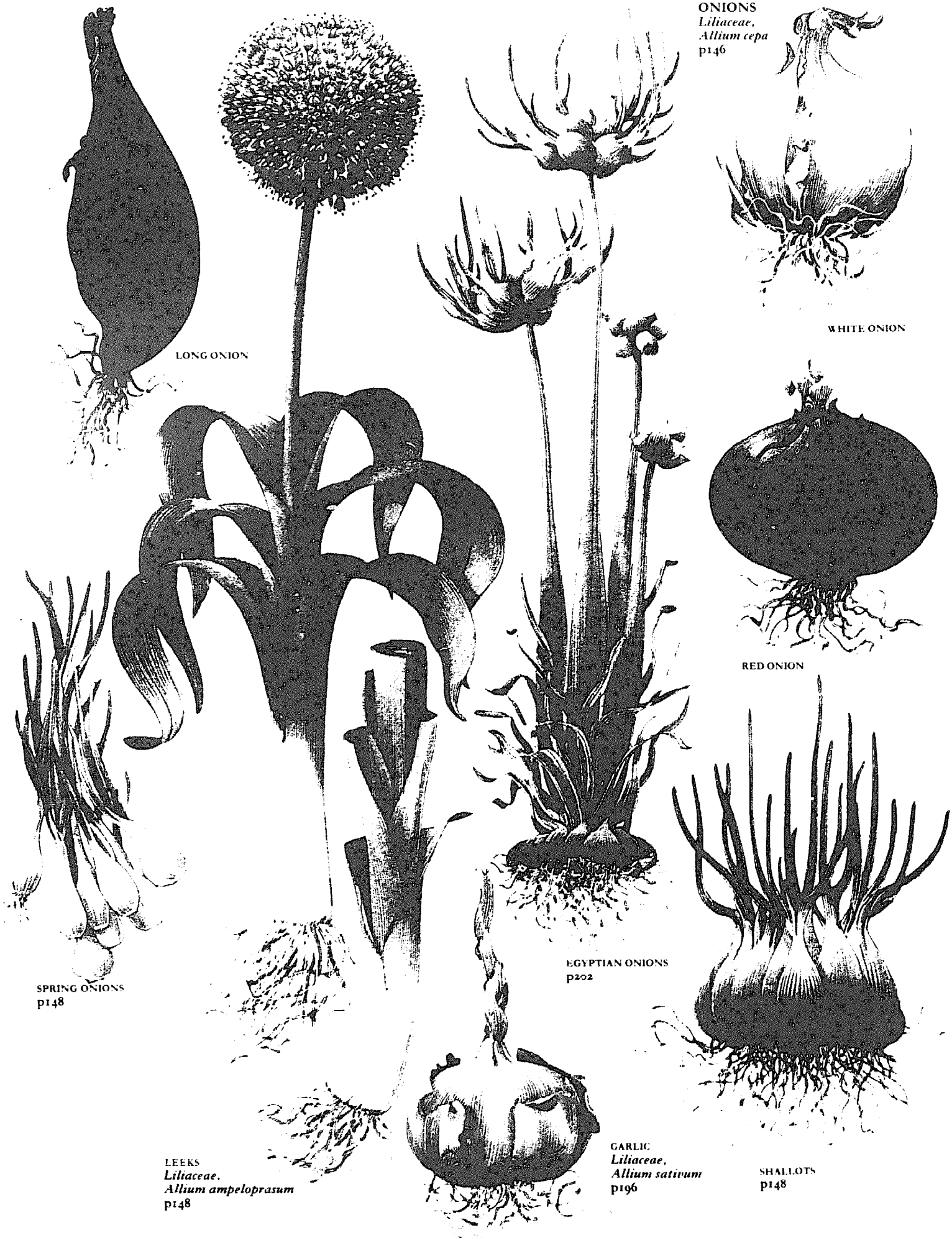

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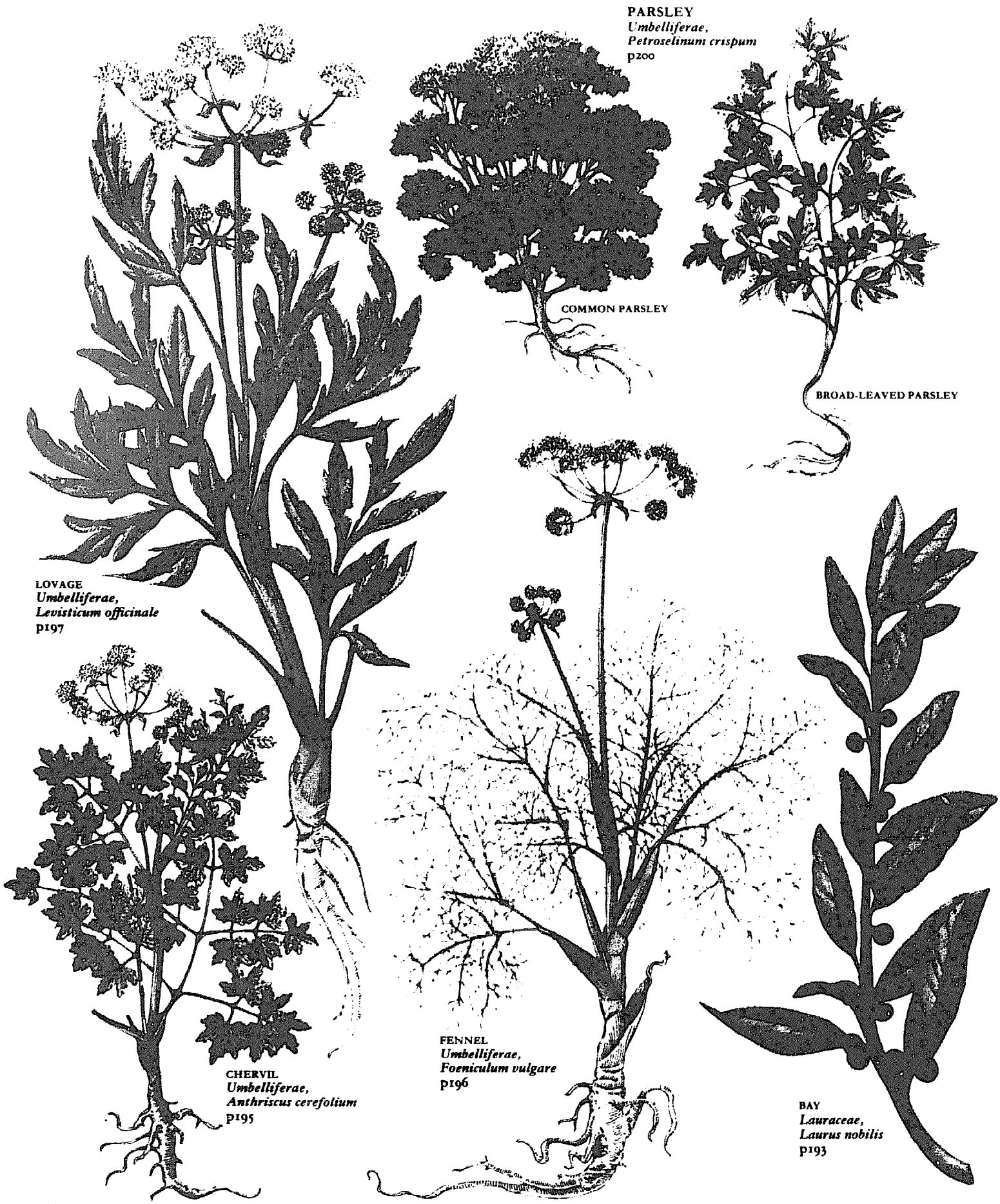
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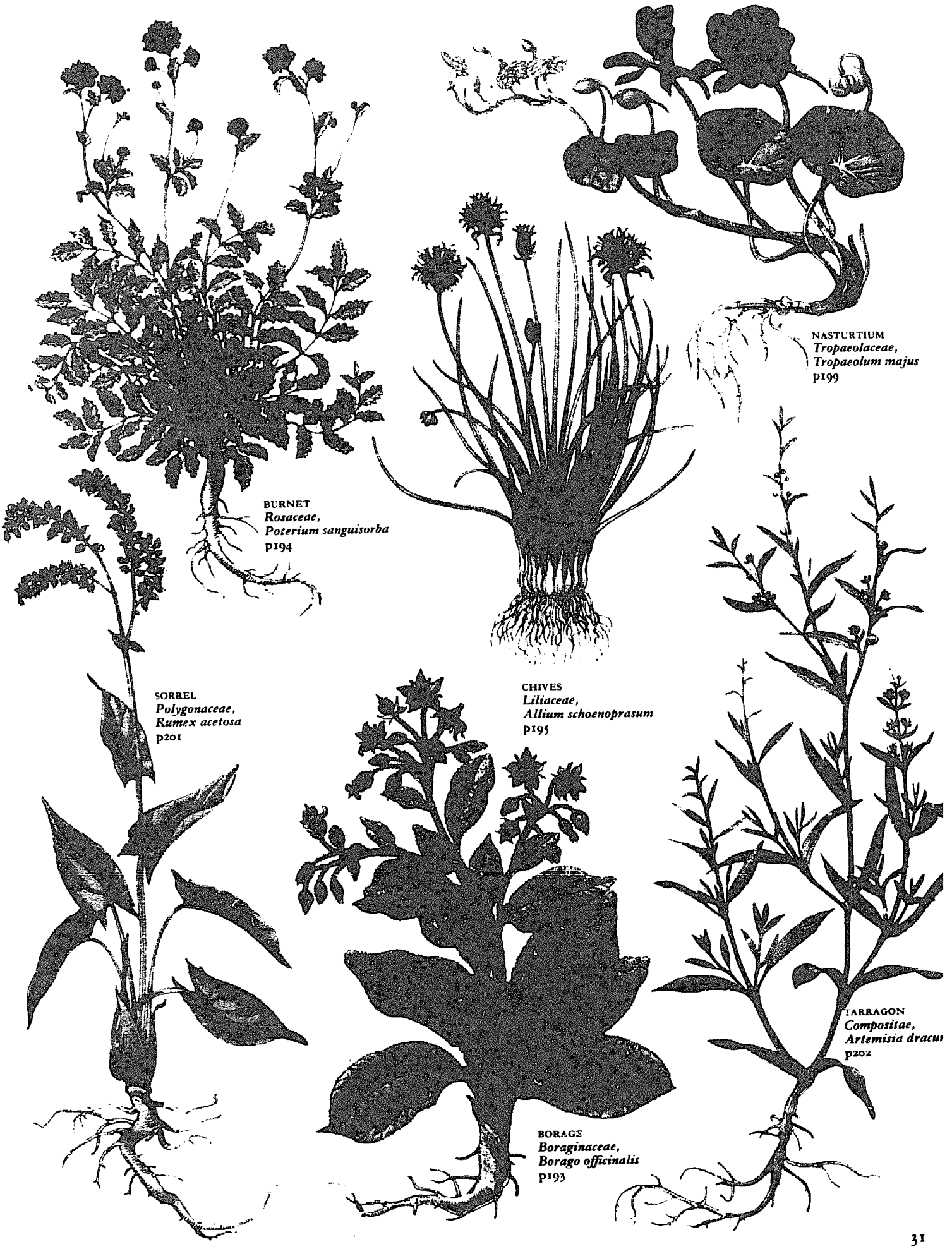

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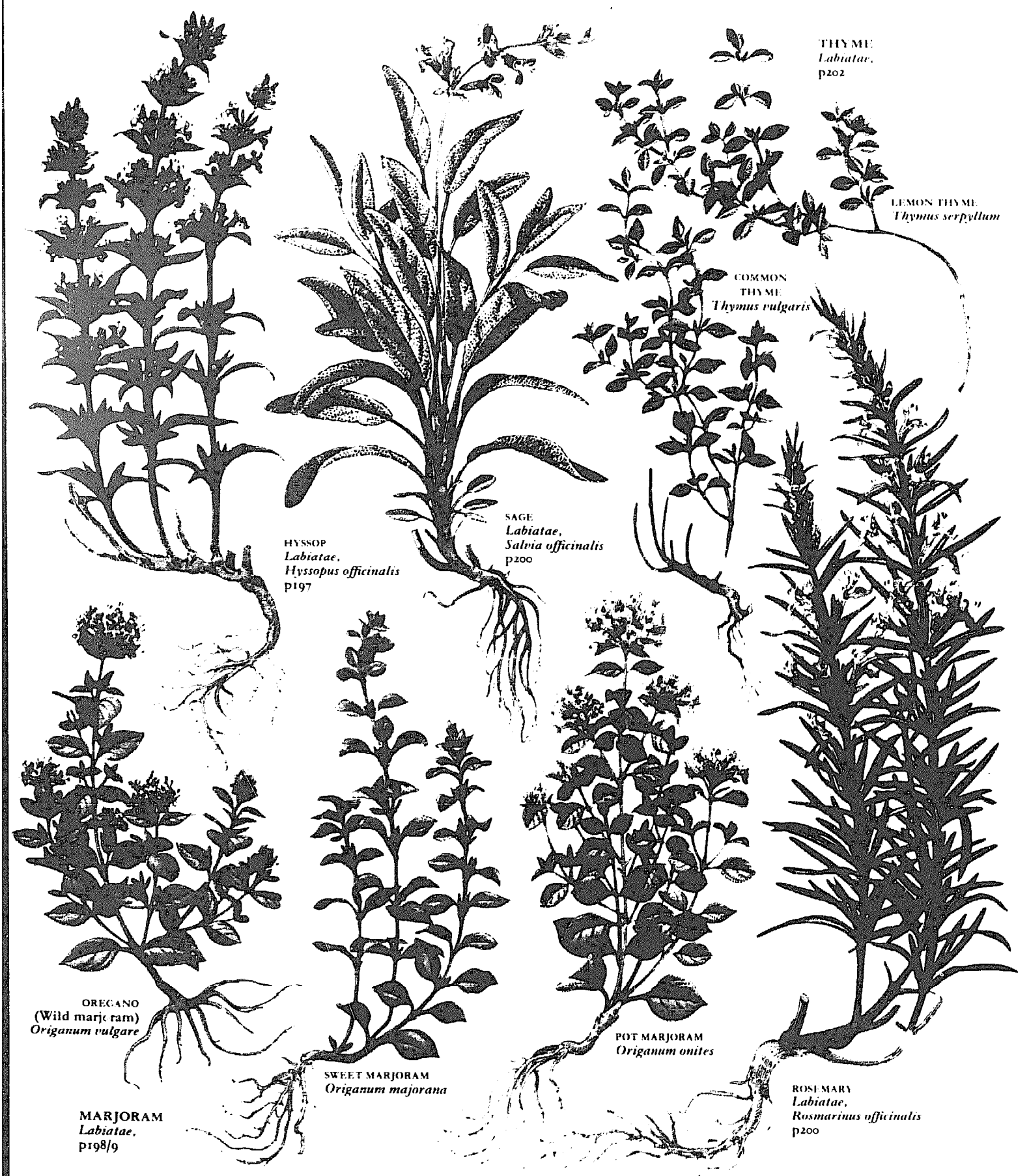
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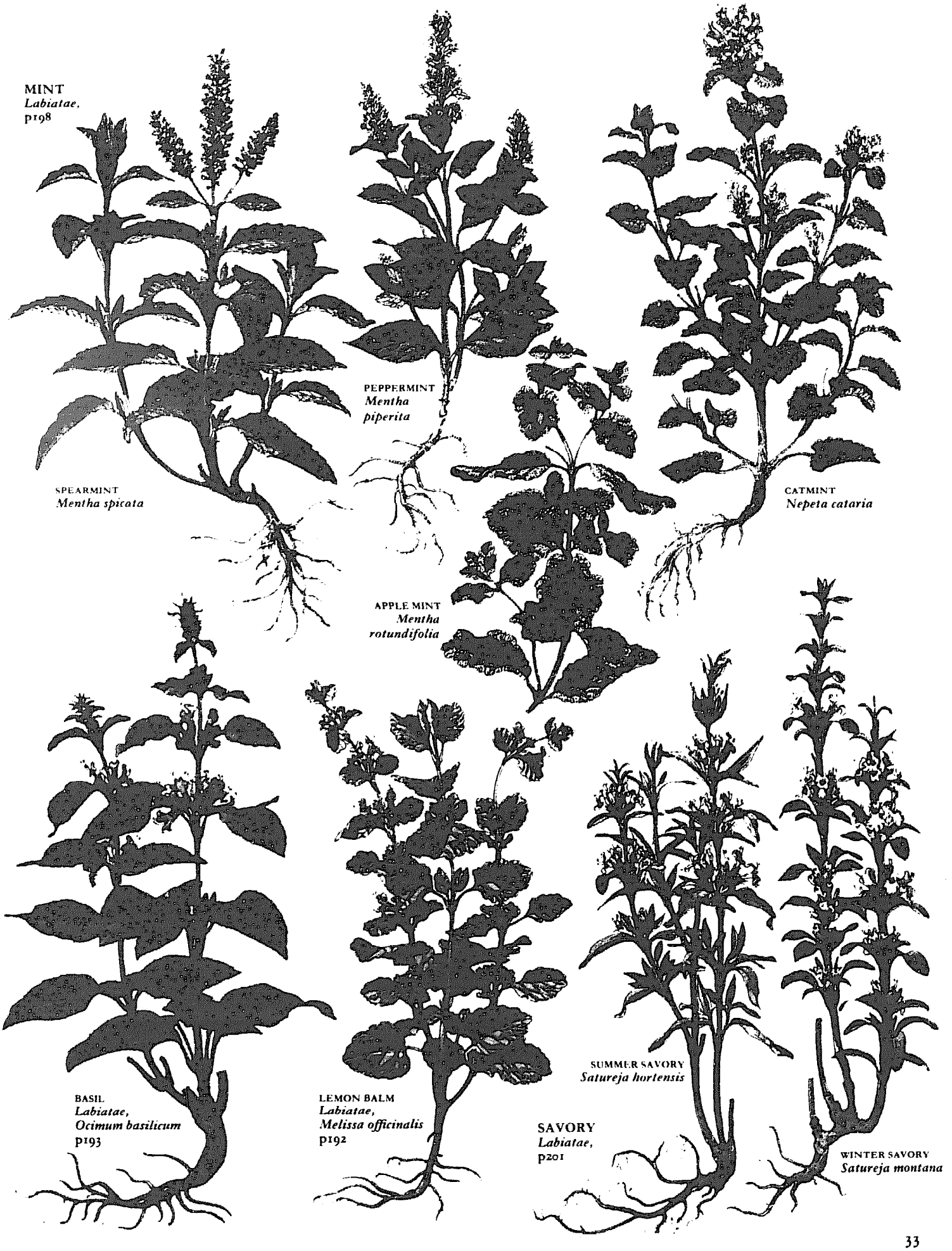

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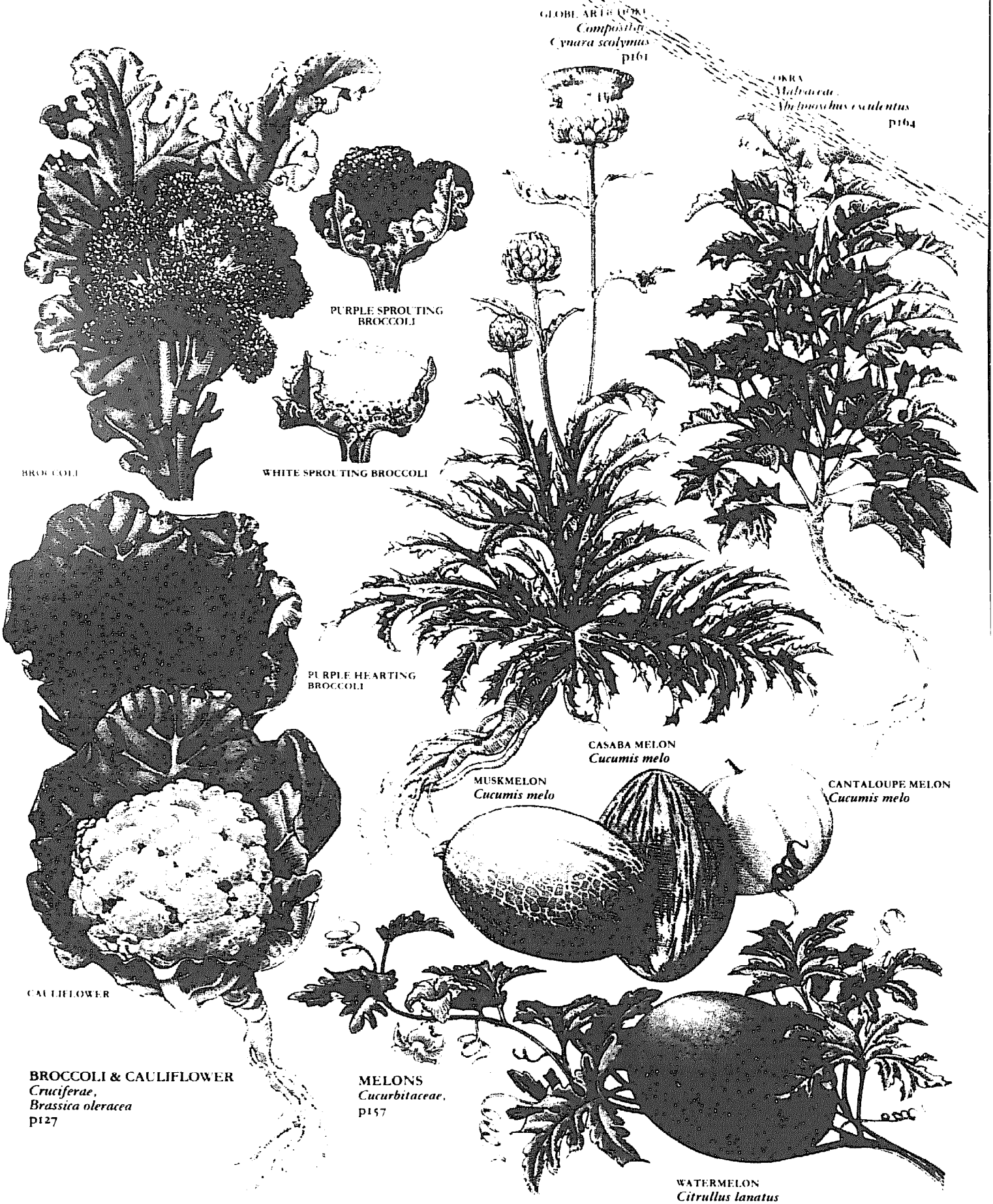

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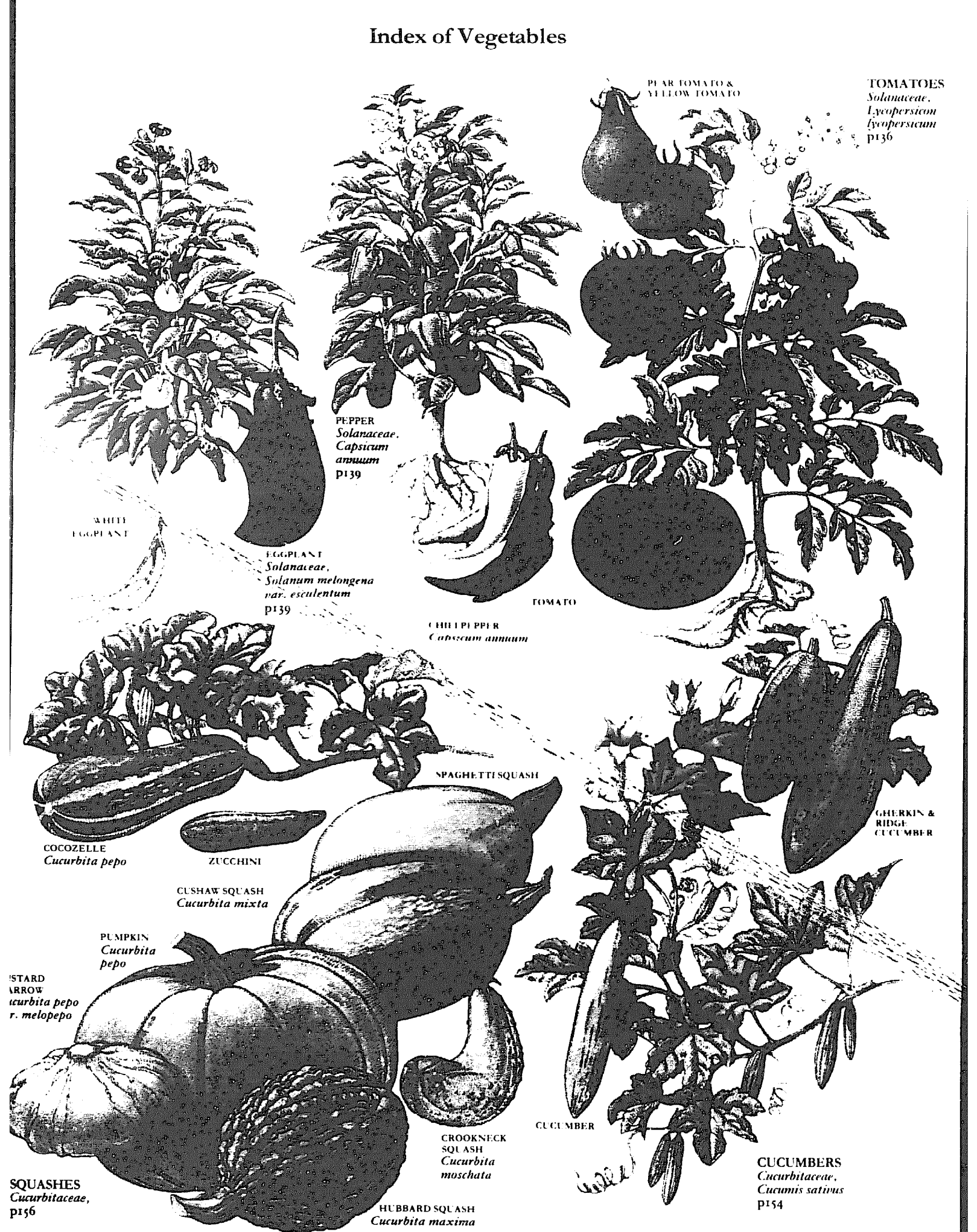

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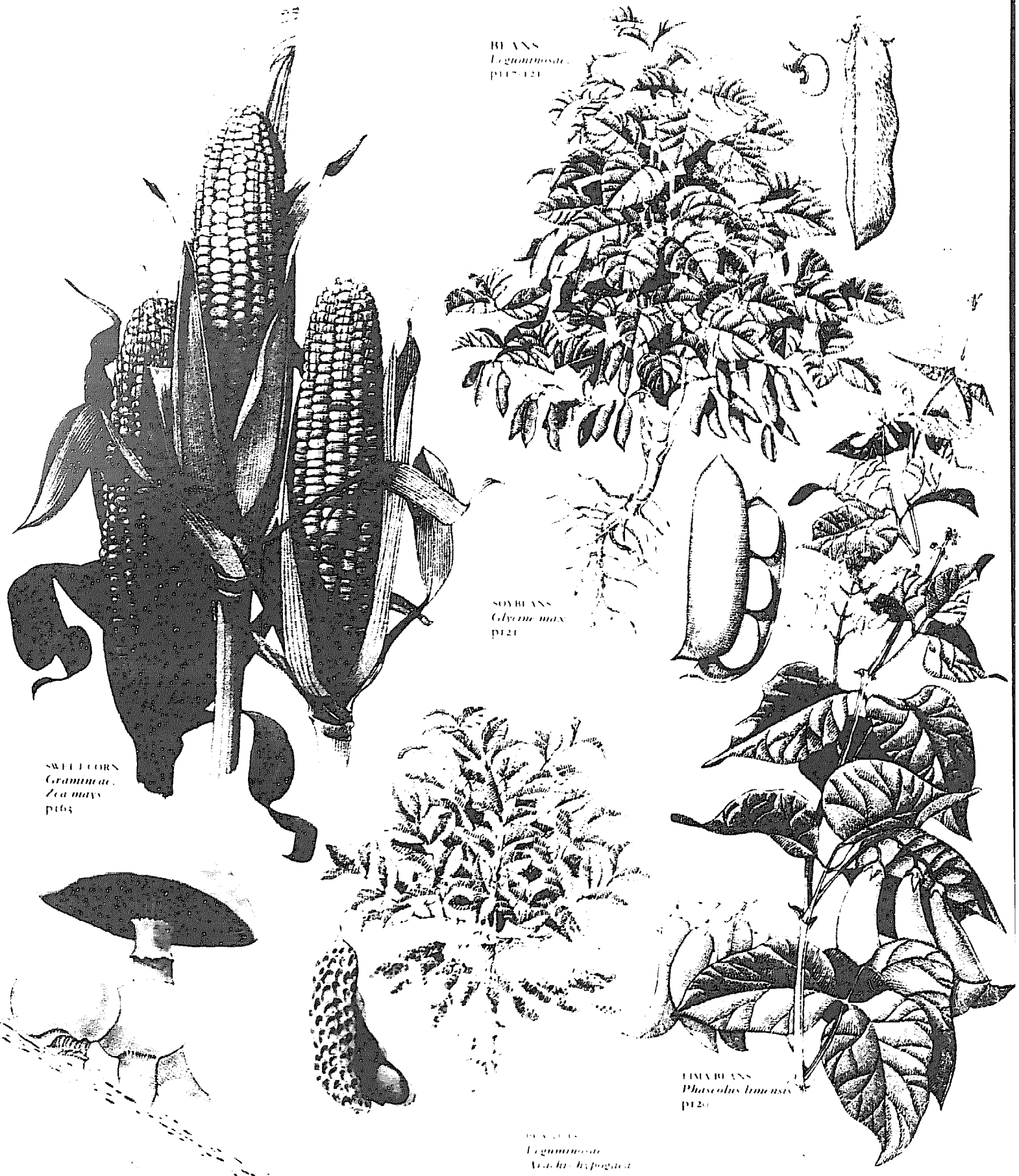

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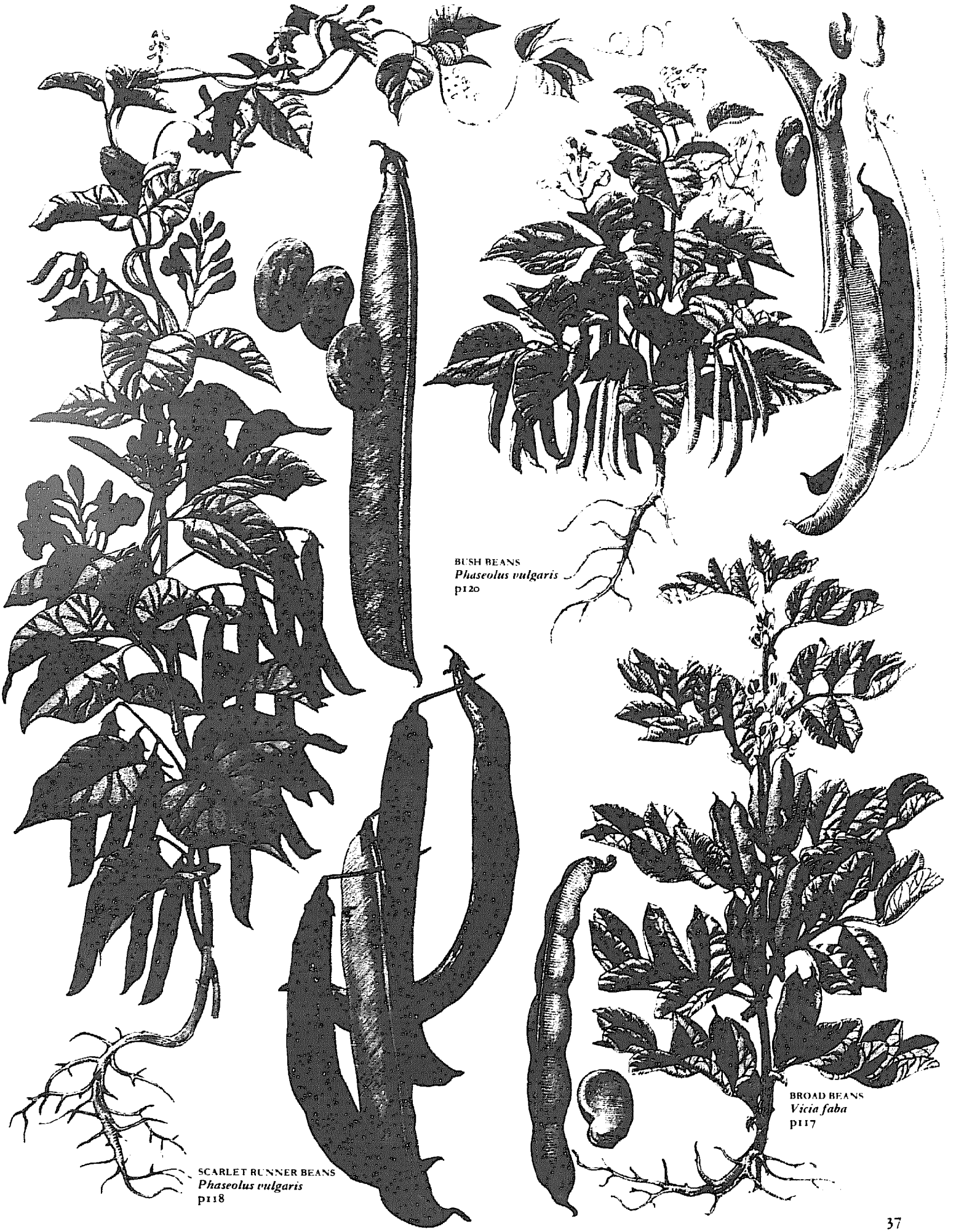

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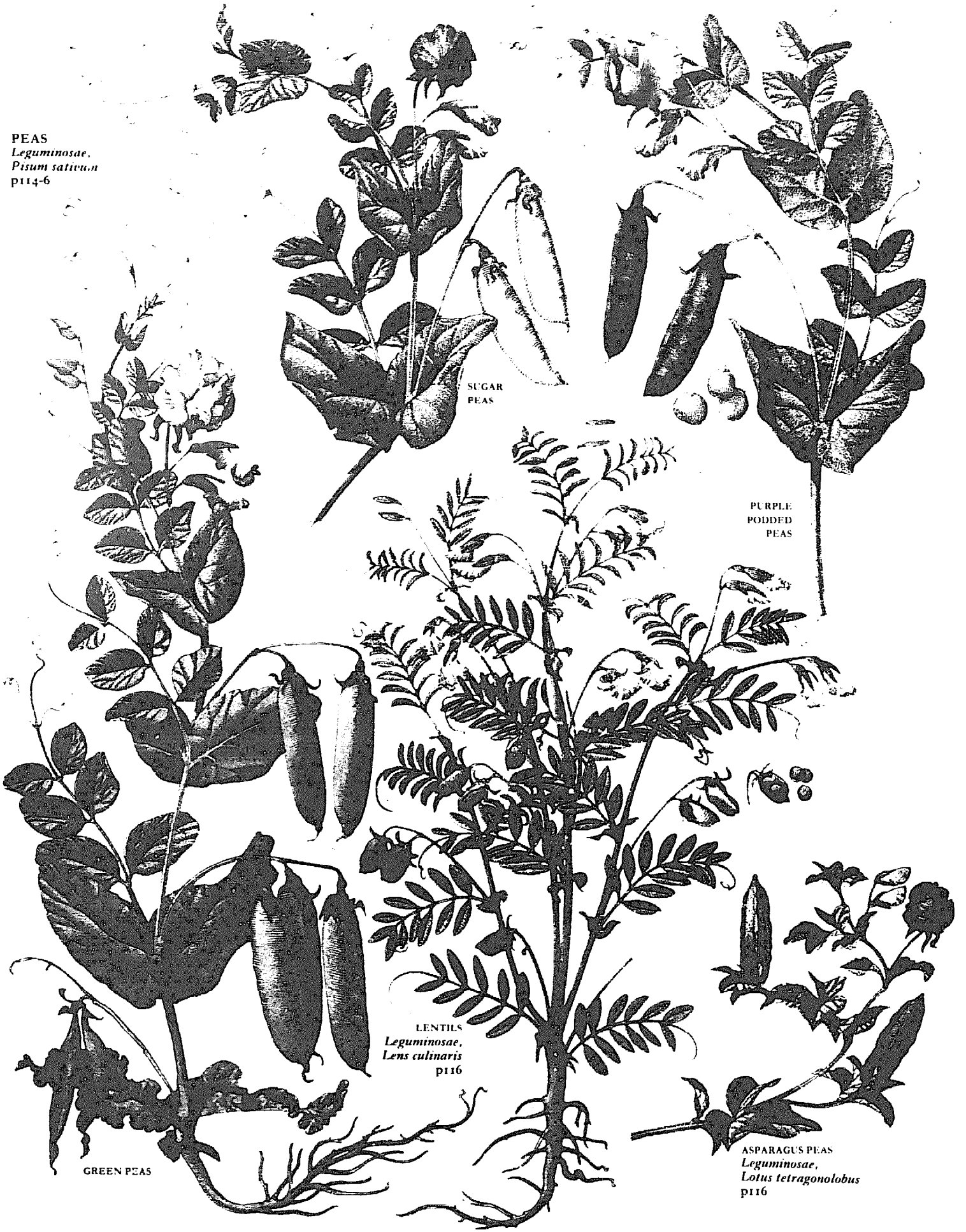
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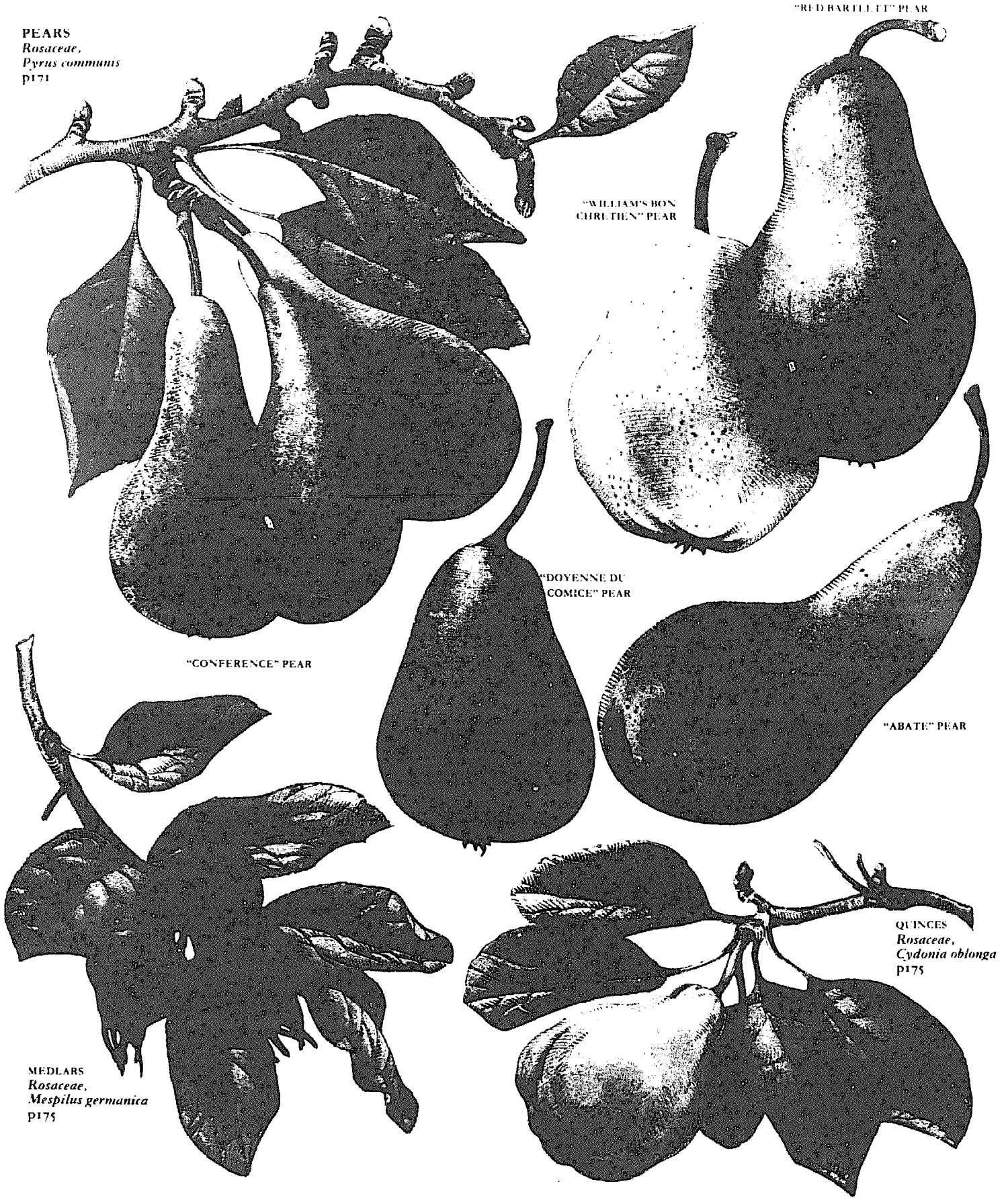
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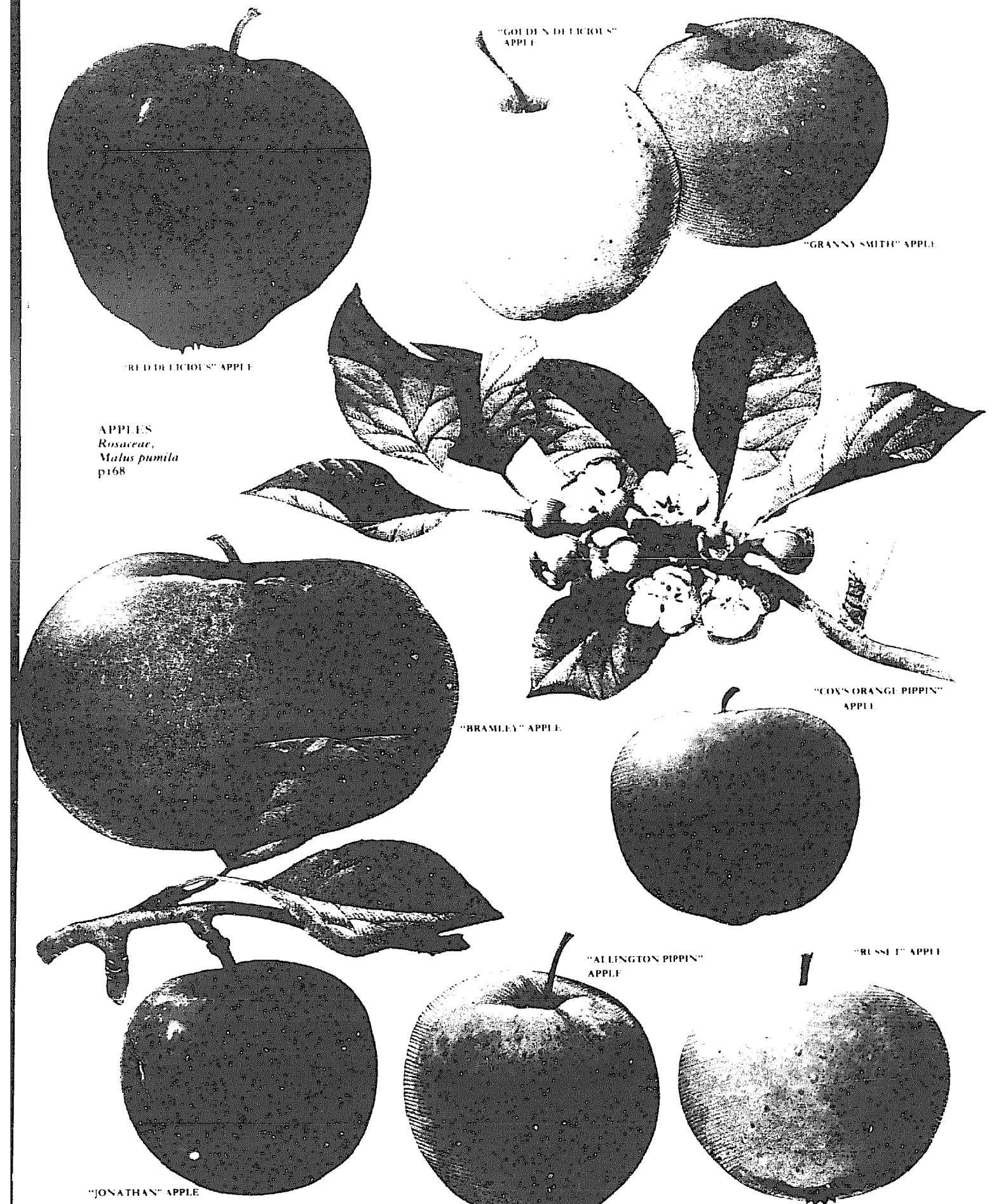

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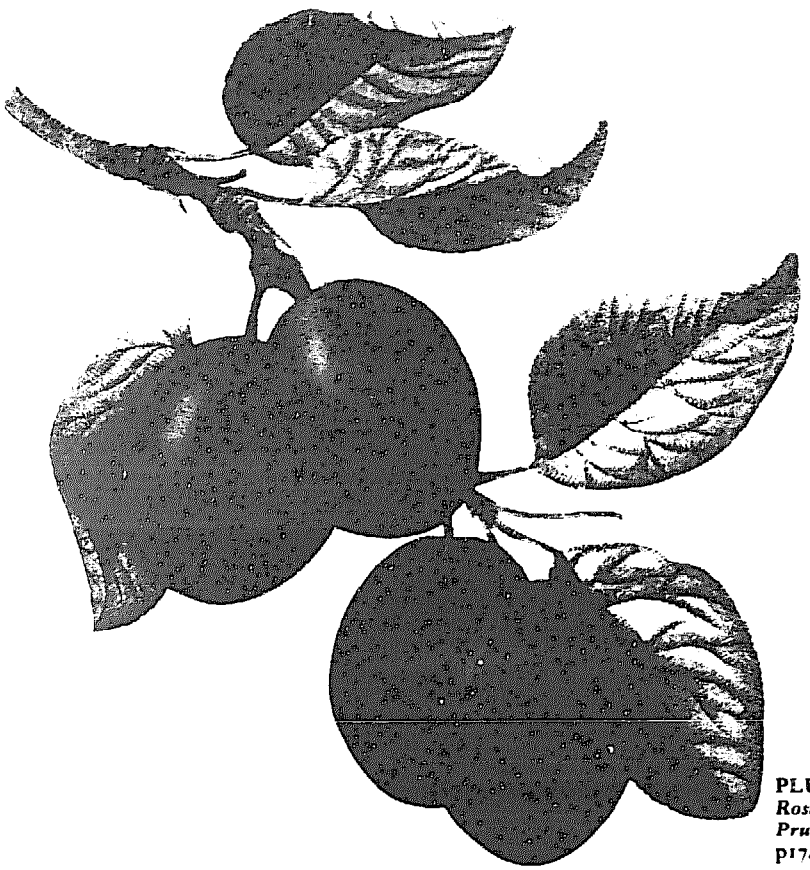

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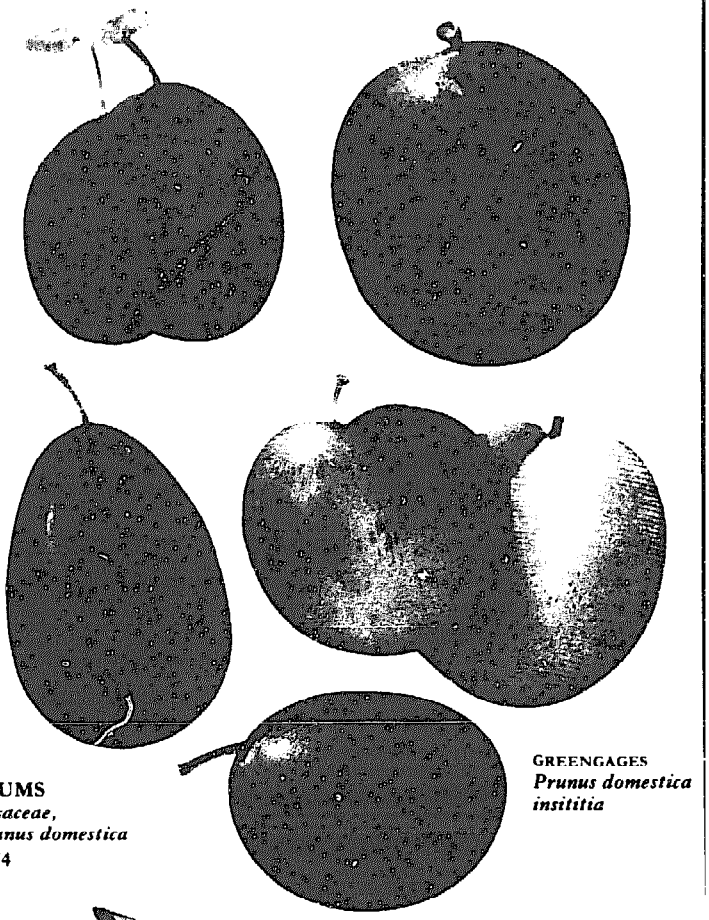

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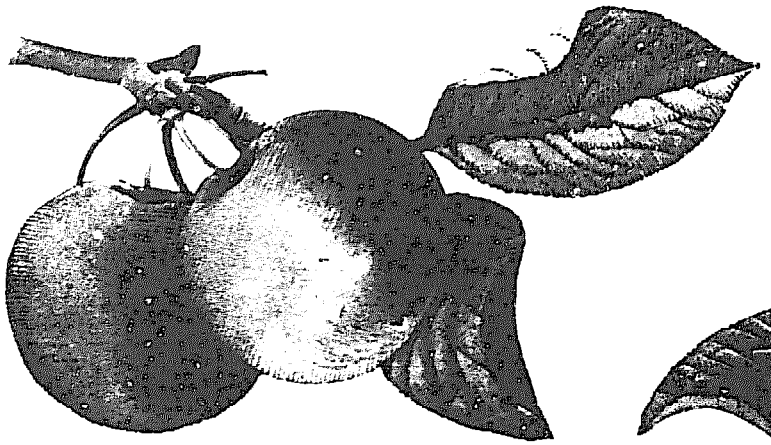

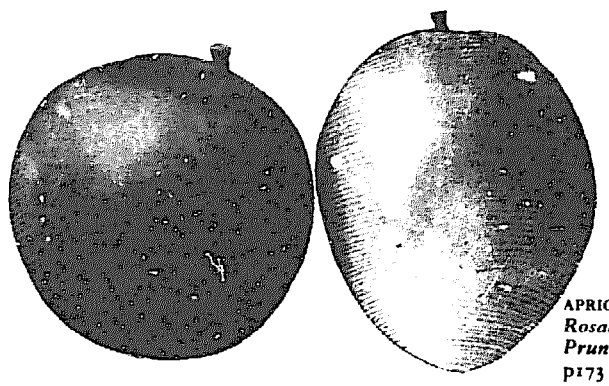

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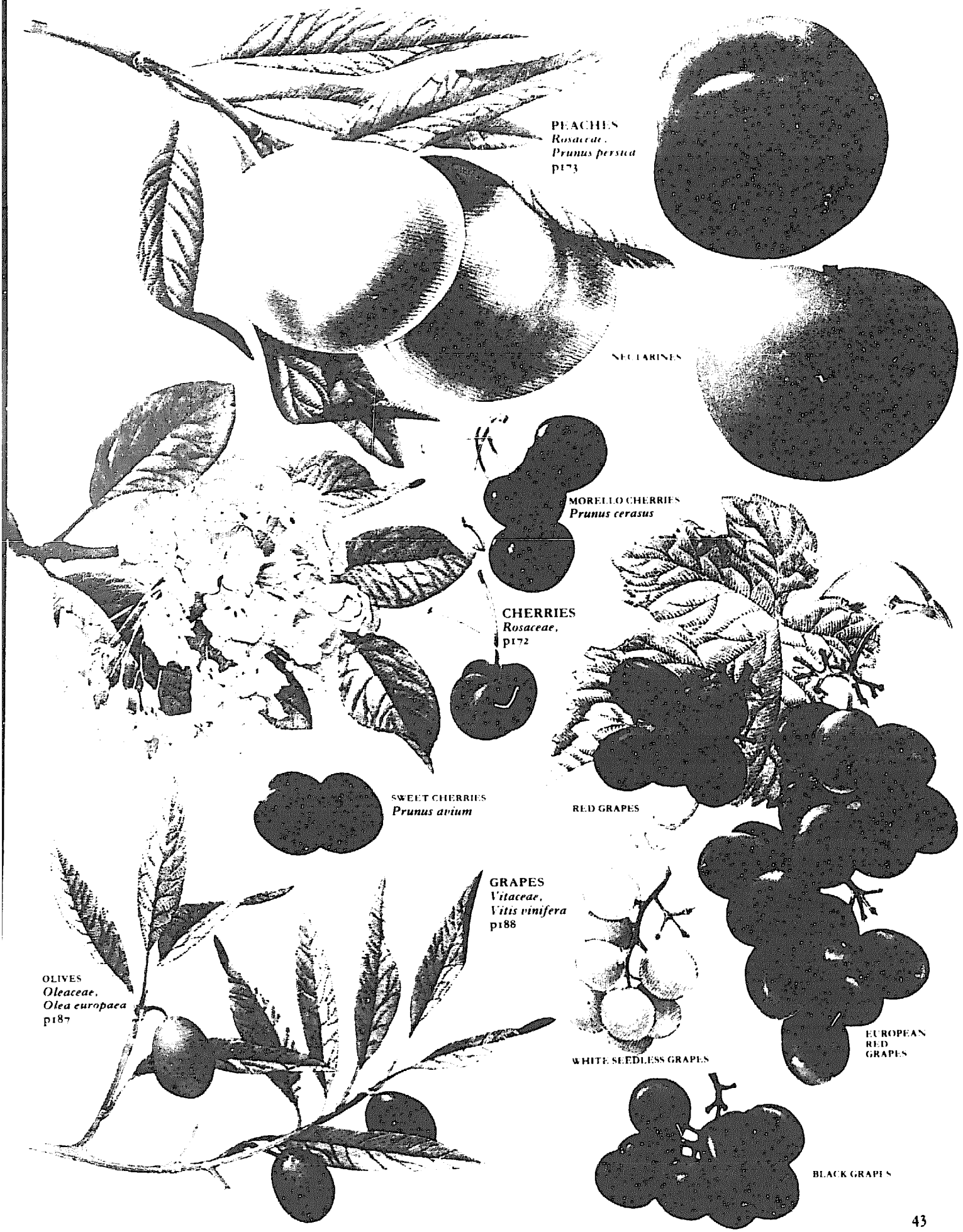

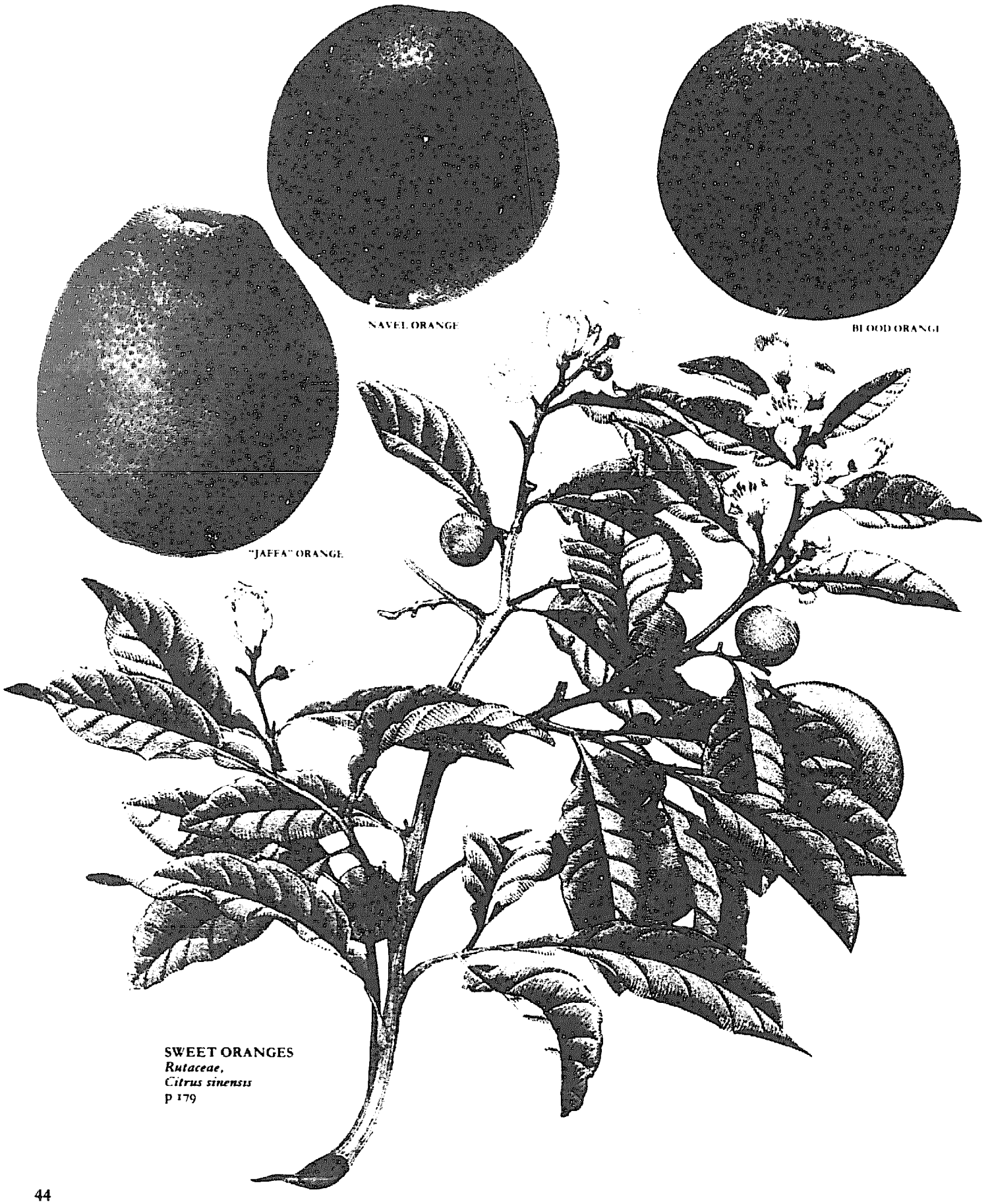

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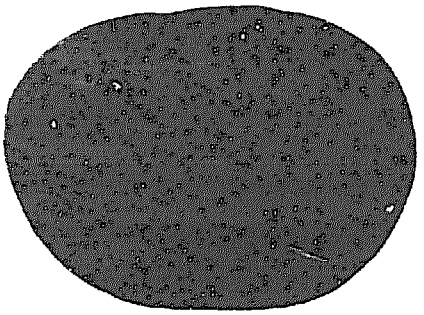

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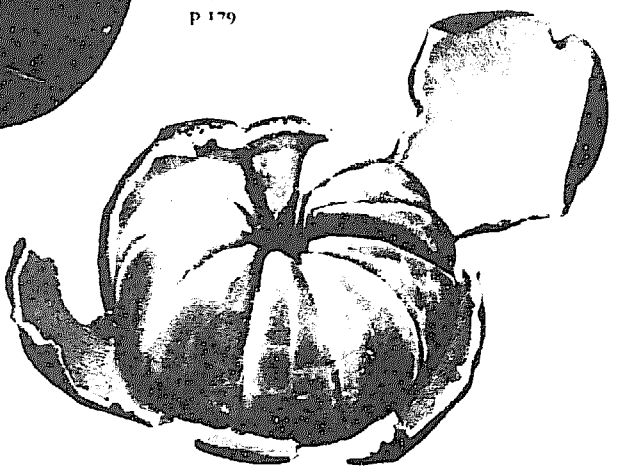

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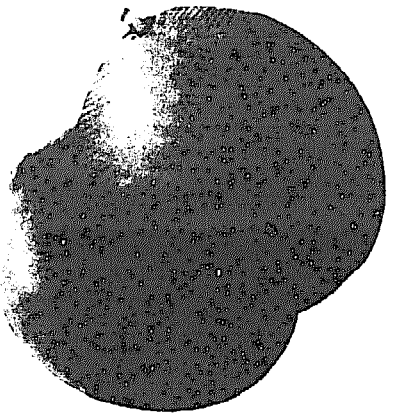

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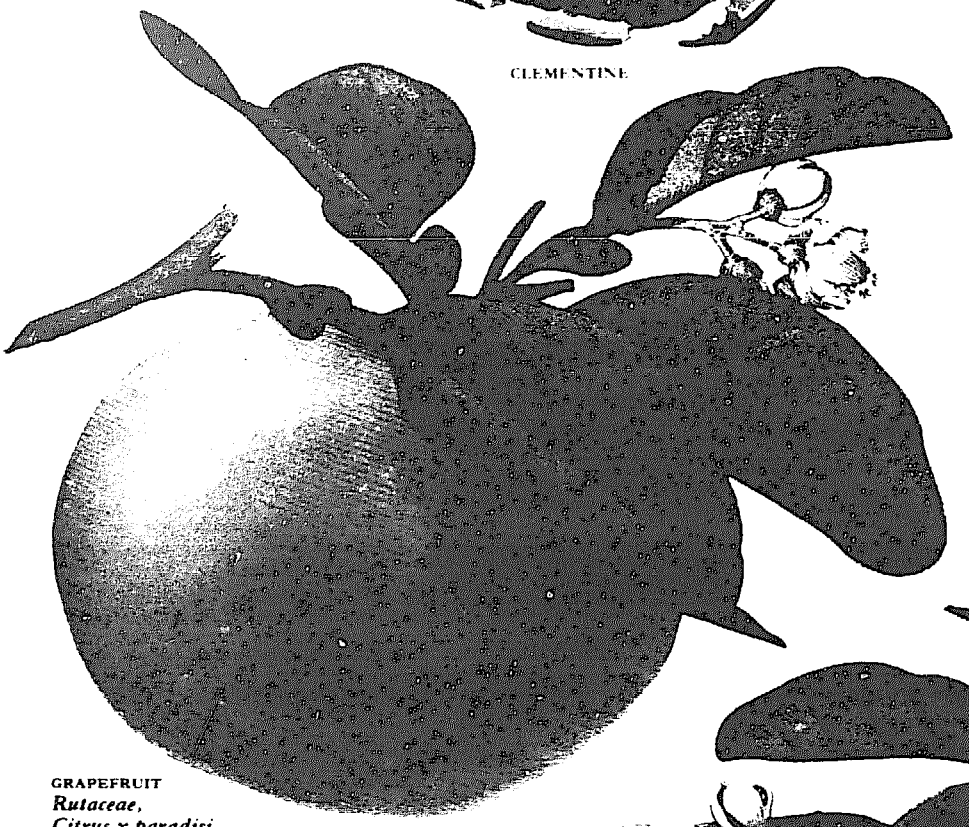

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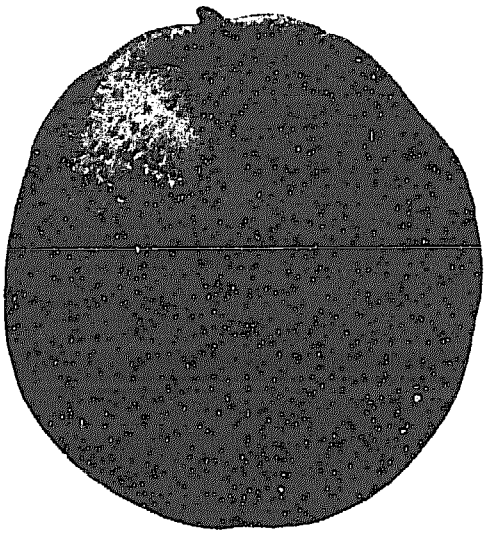

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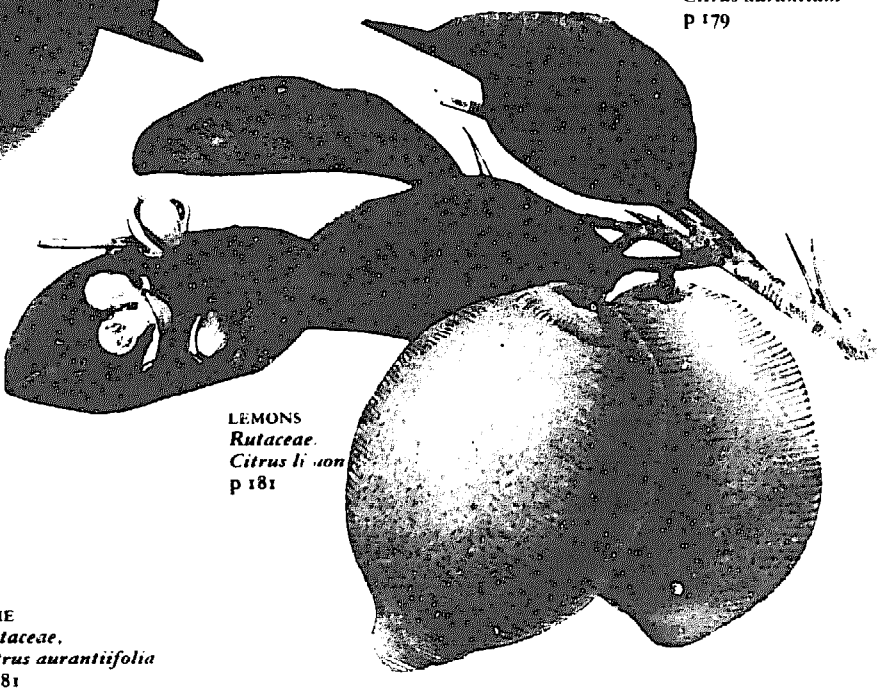

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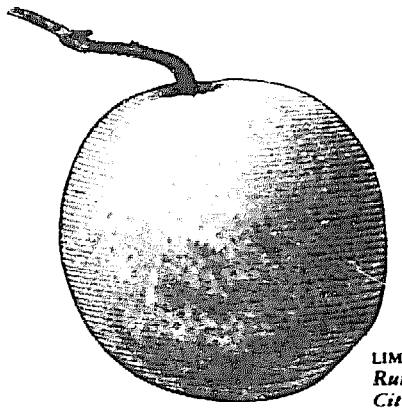

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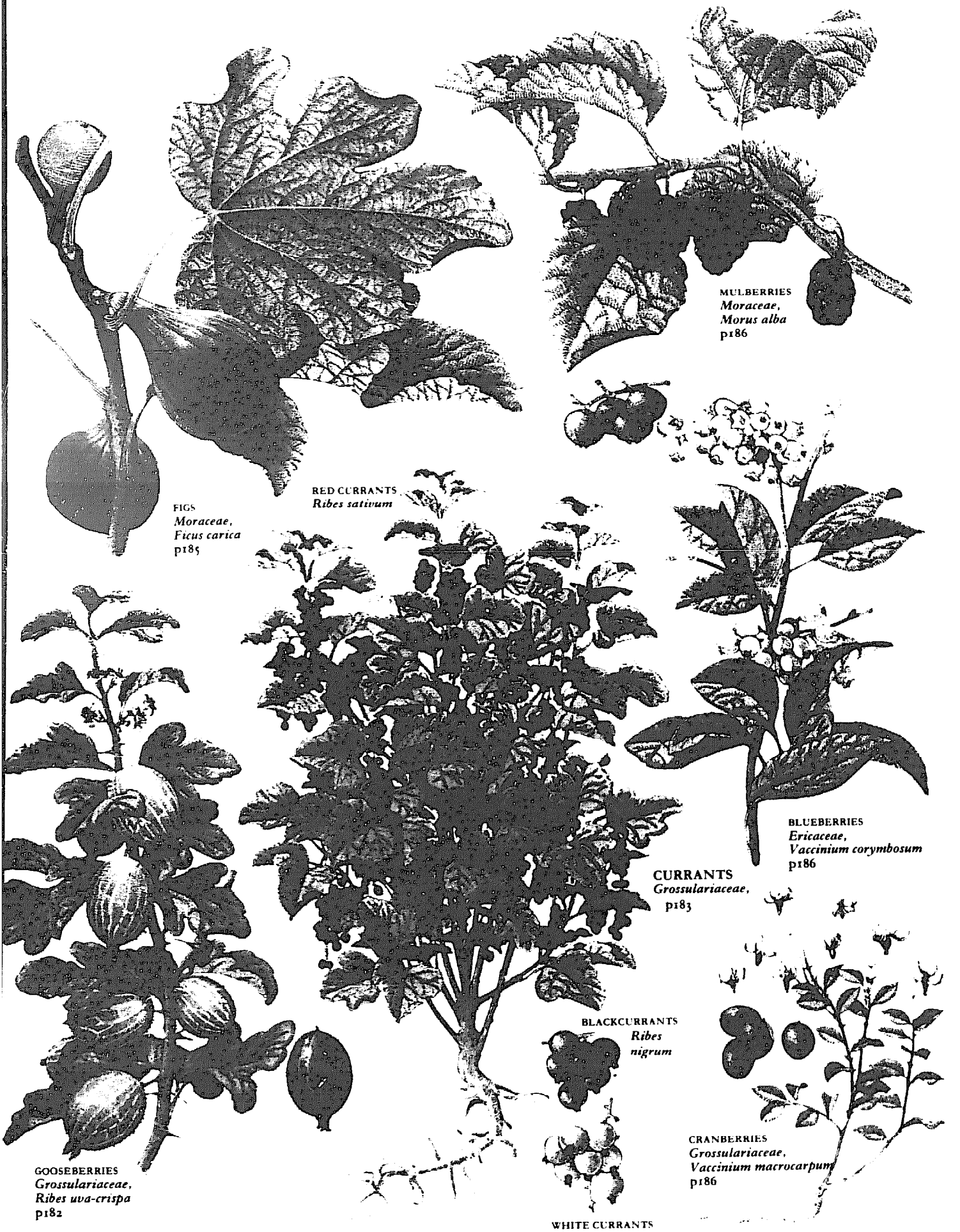

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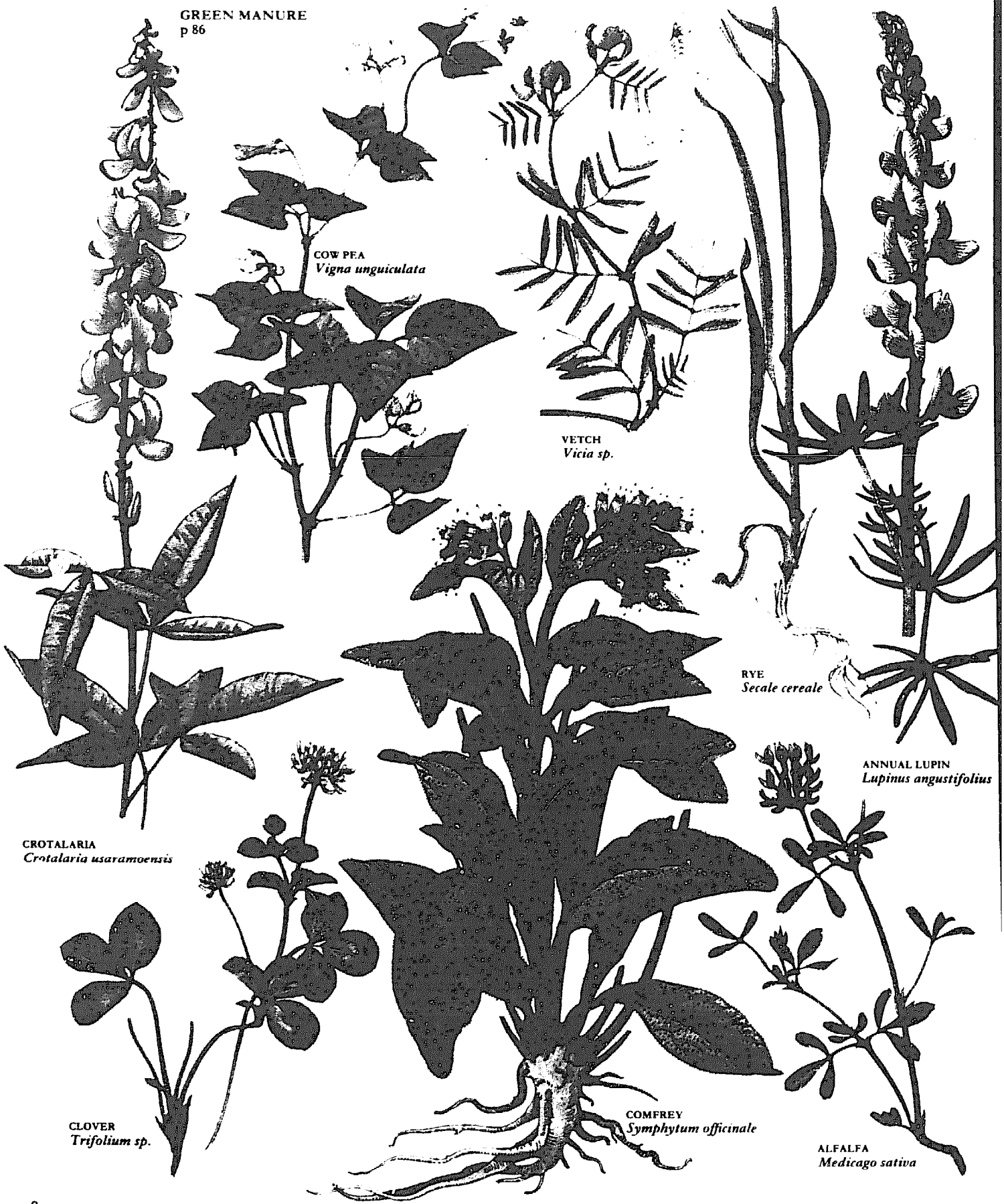
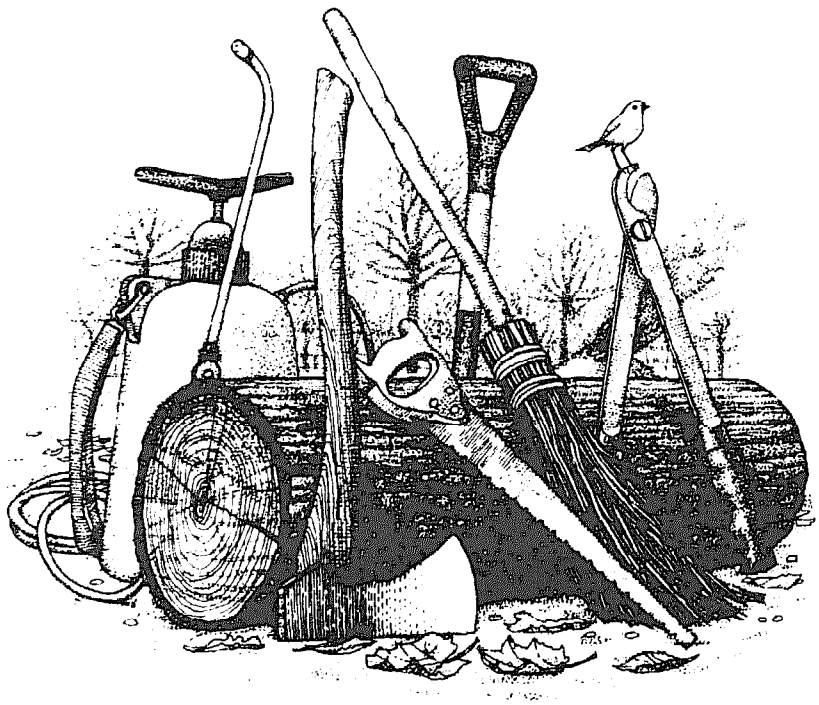


CHAPTER TWO

Gardening through the Year



Containing the cycle of the seasons, the effect of the seasonal changes on the garden, and a calendar of tasks for the diligent gardener.

Gardening through the Year

A man may live in a city all his life and scarcely be aware of the seasons: he knows it is winter when he comes out of his house and finds a new fall of snow on the sidewalk; he knows it is summer because he can feel the heat of the sun. But as soon as that man starts a vegetable garden the seasons become all important to him: they dictate the tasks he must perform each month and they bring with them their own peculiar weather, which sometimes helps, sometimes hinders. If a gardener forgets some vital operation at any time of the year he will find he will suffer for it later on — perhaps twelve months later — when he has to go without some useful crop or buy it from the market.

A philosophical gardener will say to himself: "there is no bad weather!" The rain that stops him doing his spring digging is good for his early seed-beds; the drought that is shriveling his summer lettuces is giving him a chance to get out with the hoe and win the battle of the weeds.

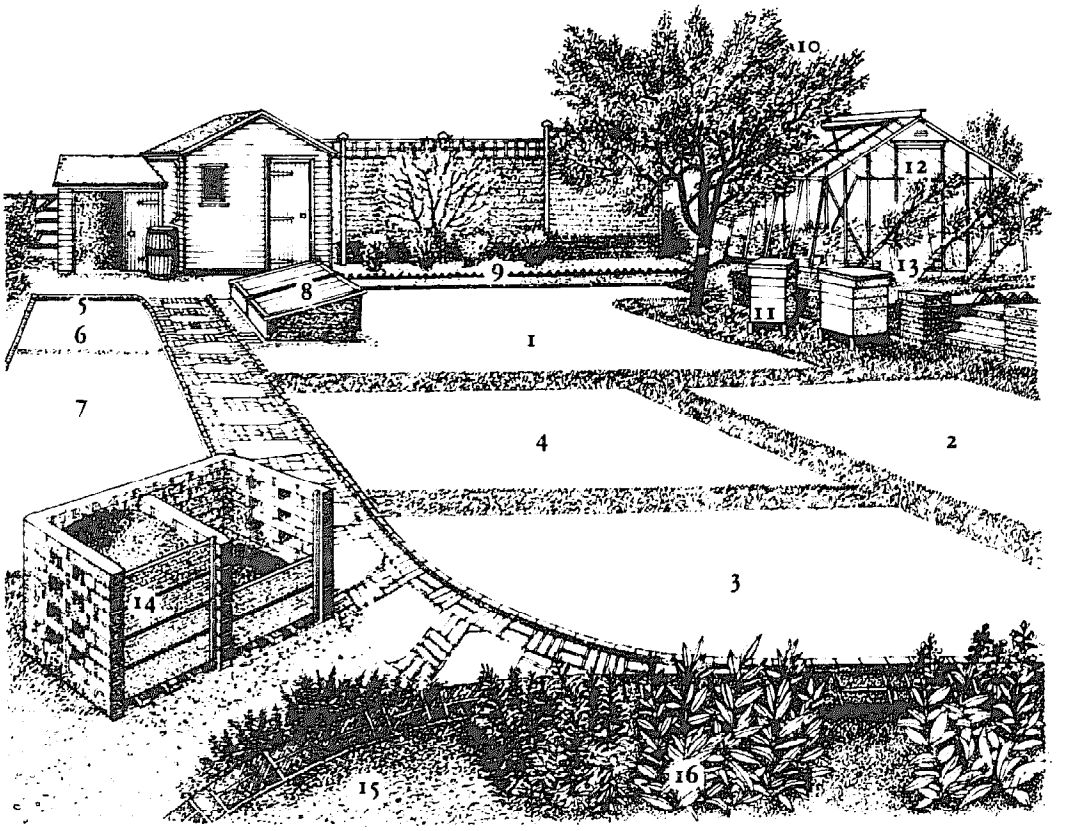
There is no bad season: every season presents the gardener with a challenge and an interest of its own. All weather is good for somebody, or some plant, somewhere. The gardener cannot change these things. He must accept the challenge of learning to understand the seasons and of adapting himself to work within their never-ending cycle.

On the following pages the seasonal activities in a typical food producing garden in a temperate climate are described in detail. The illustrations show how the same garden changes through the year. A key to these illustrations is provided below.

WINTER

During the spring, summer and fall you may feel you are under pressure. There is always an imperative: weeds to combat, seeds to sow, plants to plant, summer pruning to do, food to harvest and so on. When you have got the last of the root crops harvested in the fall you may well heave a sigh of relief and feel you can relax.

Now you can stand back and take stock, congratulate yourself on what has gone right and not lose too much sleep over what has gone wrong. Now is the time to tidy up, lay paths, build sheds, put up a new greenhouse, repair tools and prepare for next year's food-growing campaign. But don't



KEY TO SEASONAL GARDEN

The garden which is illustrated on the following pages contains four plots for annual vegetables. These plots are cultivated according to a four course rotation, so the vegetables grown in each vary from year to year. In the year illustrated the plots are allocated as follows: **1** *Plot A — Miscellaneous* **2** *Plot B — Roots* **3** *Plot C — Potatoes* **4** *Plot D — Peas and beans/brassica. You will notice that in winter and spring some vegetables from the previous year's rotation are still growing. The garden also includes:* **5** *Seed-bed* **6** *Holding-bed* **7** *Perennial vegetable bed* **8** *Cold frames* **9** *Soft fruit bed* **10** *Standard fruit tree* **11** *Bee hives* **12** *Greenhouse* **13** *Cordon fruit trees* **14** *Compost heap* **15** *Rhubarb* **16** *Herb bed.*

The Winter Garden

THE PERENNIAL PLOT
If you have left your asparagus ferns on the plants, now is the time to cut them off with a sharp knife and put them in the middle of the compost heap. Do the same to the globe artichokes, which by now will be dying down. Put a heavy dressing of compost, straw, seaweed, or other mulch on the perennial beds; this will protect the roots against the cold, as well as rotting and improving the soil.

TOOLSHED, TOOLS AND FENCES
The winter is the time of year to attend to all garden hardware. Do all maintenance work now so as to spare yourself when the heavy work begins in spring.

SEED AND HOLDING-BEDS
These should be covered with green manure by now. Leave them alone.

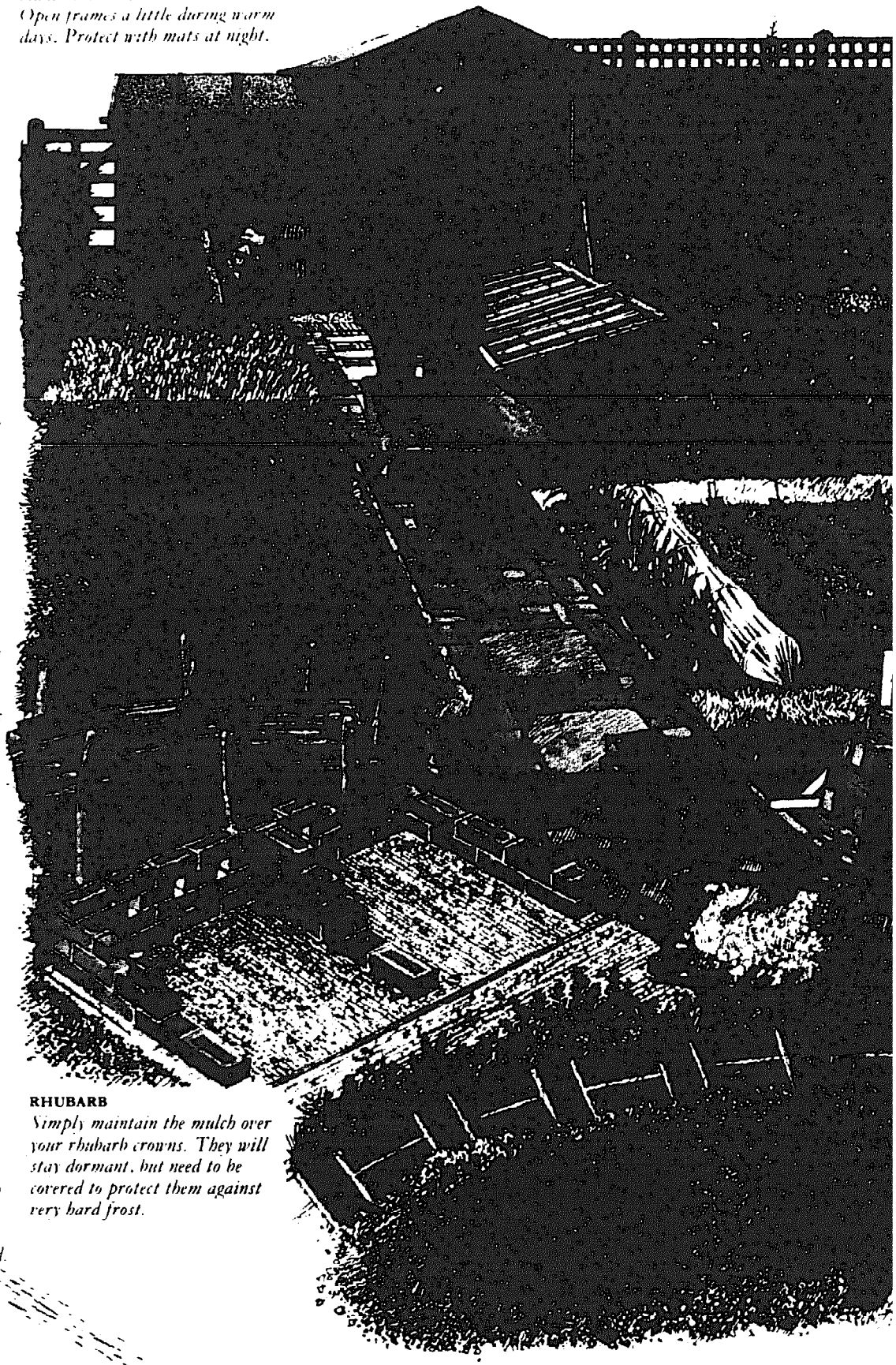
PLOT A
Brassica
In mild climates this is the bed you can depend on most all through the winter. At first there will be cabbages and Brussels sprouts to pick and eat; later in the winter when your other cabbages have been eaten, savoys will come to the rescue, along with broccoli which can stand a lot of cold weather; finally, curly and other kale will weather the storms and come through to feed you in the spring. Spring cabbages will have been planted out, and should now be protected if necessary by cloches or a plastic tunnel.

PLOT D
Potatoes/Peas and beans
Leeks, which will have gone in after the early potatoes last year as a catch crop, have grown well, are earthed up, and can be harvested through the winter.

COMPOST
Protect your heaps of compost from winter rain by putting something on top of them: black plastic, old carpets, or even old sheets of corrugated iron. If you have time to turn your compost, so much the better; it will heat up again and mature all the quicker. Don't leave it in the heap too long once mature – get it onto the land.

THE COLD FRAME
Winter lettuces should be growing here. Take your endives out and blanch them indoors in the dark. Open frames a little during warm days. Protect with mats at night.

FRUIT TREES
Plant new trees in late winter. Do winter pruning and winter washing in the late winter months. Give your trees a heavy mulch or otherwise plenty of manure.



RHUBARB
Simply maintain the mulch over your rhubarb crowns. They will stay dormant, but need to be covered to protect them against very hard frost.

SOFT FRUIT

Towards the end of winter, you can prune your blackcurrants, and other soft fruit. Winter wash if your bushes are attacked by aphids or borers in the summer.

THE GREENHOUSE

As the winter goes on you will come to sow more and more seeds in seed boxes. As you clear the winter lettuce, dig and manure the soil in preparation for planting next year's crops in spring. It is a good idea to alternate your cucumber and tomato houses or, at least, the soil in which you grow these vegetables. Every winter, it may be necessary to remove all the earth underfoot and replace it with new topsoil to prevent disease. Plastic bags bought ready-filled with peat may be cheating, but they will certainly save you all this trouble.

BEES

Leave your bees severely alone, but ensure that the hives are not blown over in winter gales.

PLOT B

Miscellaneous/Roots

This is another plot you can count on most of the winter, if you can dig up the carrots, beets and celery frozen into the ground. The rest of the plot should be sleeping peacefully under a winter coat of green manure and you can leave it strictly alone until the spring. If you happen to get a series of fine dry days, however, you may take a spade or fork to it, and get some digging done before the big rush begins in spring.

PLOT C

Roots/Potatoes

There may well be some parsnips left in this bed, which last year held the root crops. The parsnips you can leave in the ground until you want them, except in regions where there is snow or a very hard winter frost. So all of this bed will have been dug up, or will be on the point of being dug up: in other words the bed lies fallow through the winter. Wheel manure out on to it whenever the weather allows, in preparation for it to become the new potato plot in the spring.

HERB GARDEN

In the winter, if the weather is reasonable, you can transplant deciduous herbs (or indeed any others – but remember that you can transplant evergreens in the summer as well). Otherwise now is the best time for the herb garden to rest.

jars of tomatoes, sauerkraut and chutney in store.

The root cellar, or those old crates in the garden shed, will be yielding up their store of potatoes, turnips, carrots, beets, kohlrabi and so on. There is no point in surviving the winter to find you still have a ton of old roots which you don't really know what to do with. So be generous to yourself. But, at the same time, don't forget that the new potatoes very likely won't be ready as early as you think they will.

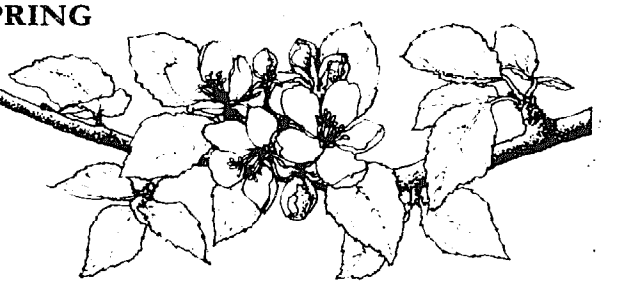
Now is the time you will be glad you salted down the pole beans. In the pouring rain, or when there is a heavy frost, or when a blizzard is blowing, think how nice it is not to have to go outside, and down to the garden to pick Brussels sprouts or kale.

In the south you can plant trees or bushes through the winter, as long as the ground is not too wet or frozen. Thin raspberry canes and tie them to the wires, and prune your blackcurrant bushes. Mulch or manure all soft fruit heavily and top fruit too if you have the manure to spare. It is far better to suppress grass and weeds with mulch near soft fruit bushes or fruit trees than to hoe or dig. Digging is particularly bad for the spreading roots of raspberries and not good for currants either. I leave the pruning of fruit trees until February, and after pruning I spray with winter wash (see p. 104). If your trees are heavily coated with lichen it may be a good idea to spray with a lime-sulfur wash. If you can't get this, one pound (400 g) of caustic soda dissolved in six gallons (23 l) of water will do the job.

DEEP BED IN WINTER
In winter the deep bed which will grow next year's peas and beans should be limed if the pH is below 6.5. Sprinkle the lime on with a trowel and then rake it in, taking care not to walk on the bed.

By late March you will already feel the approach of spring and begin impatiently to start putting seeds in. Take care not to start too soon. If the ground is dry enough and unfrozen, parsnips and shallots can go in. And you can sow all sorts of seeds: leeks, lettuces, onions, cabbages, cauliflowers and Brussels sprouts. Sow celery seeds in seed boxes in a warm house. It is always best, particularly with plants you wish to start growing early, to plant little and often, rather than to risk the lot at one go and find later that nothing has grown because of a late frost.

SPRING



As winter fades, too slowly, into spring, the sap begins to rise not only in the gardener, but in the garden. And now is the time when you must resist a mounting feeling of panic. You cannot do everything that you have got to do, but the spring is longer than you think: as long as you got things fairly straight last fall and kept them so all winter, you will find that by simply digging your garden quietly, all the spring jobs will get done in good order.

And don't be in too much of a hurry. If you put seed in very early, as early as many people tell you to, all too often cold weather, or wet weather, or dry weather, will set in and your seed will rot in the ground. Sow a little of each kind of seed early (very early if you have previously warmed up the soil with cloches or mini-greenhouses), and then wait until things warm up a little more before sowing the rest. Nature is not in too much of a hurry in the spring, nor should you be.

Anyway if you think about it, you do not want all your early potatoes or whatever very early. If you have just a few plants, or a short row, of very early earlies, these will be enough to give you a treat before the main crop of earlies (if such a thing can be) comes along a couple of weeks later.

As for the true main crop plants – winter

brassica for example – these want to go into a dry warm bed. If you put them into a freezing wet one, they won't come up any quicker than if you waited two weeks longer before putting them in, and some of them won't come up at all.

Before spring actually arrives, you should be thinking about those two hardy plants, parsnips and Jerusalem artichokes. In England I always sow some parsnips and plant some Jerusalem artichokes in February if the ground is not frozen solid. The artichokes really don't mind what you do to them; if you put them in the ground they will come up. However, parsnips, which come from seed, need seed-bed conditions. But don't sow seed in soaking wet ground just because the time of year seems right.

And if you are faced with a sullen, sour, thoroughly frozen surface, looking like concrete and nearly as hard, you will have a well-nigh impossible job turning it into a seed-bed. Wait for a spell of sunny dry weather.

The ideal way to sow seed is in irrigation conditions. You sow your seed in ground as dry as dust (and dry ground is warm ground) and then you flood it. In temperate climates you can't do that, so you must just wait for those few warm days when the ground dries out to seed-bed conditions. If you have dug the land up during the winter, the loosened soil gets a better chance to dry out quickly in the first warm wind.

Here also the deep bed scores, as it scores in so many other ways. Because the beds are raised and the soil is very loose, the surface dries out very quickly and warms up at the same time. A quick fork-over should be perfectly possible without treading on the soil, and is enough to let sunshine and air in to sweeten the soil.

There are lots of tasks in the garden in spring, and it is worth listing them chronologically. You can try putting in a few very early potatoes in the first week of April, particularly if you can protect the seedlings from hard frost later on. At the same time sow leek, lettuce, onion, parsnip (if you didn't sow them in March), pea, radish, spinach and turnip seed.

In the herb garden you must lift, divide, and replant many perennial herbs and sow seeds of others. In the greenhouse or hot-bed sow more cauliflower seed in pots or seed boxes, and tomato and celery seed if you didn't sow them in March.

There are two ways of hastening growth in early spring. One is glass or plastic. You will achieve good results simply by spreading a large sheet of transparent plastic over a piece of dug ground and weighting it down with stones. The plastic keeps the rain off and allows what sun there is to warm up the ground. After two weeks or so you remove the plastic, sow your seeds, water well, and replace the plastic again. As soon as the seedlings appear and make some growth, take the plastic right off during the daytime and replace it at night. After hardening off the plants for a week or two take the plastic right away and put it over something else. The mini-greenhouse (see p. 111) is a modification of this and is a very good way of drying and warming the soil. Don't forget that all plants under such protective devices need some water.

The other way of speeding growth is to start things off indoors, in seed boxes, pots, or peat pots. "Indoors" can mean a greenhouse, frames, or just the kitchen window sill. Timing is the important factor. You have complete control over the environment until the seedlings are planted out in the garden. This must therefore occur at the right time – that is, not when a vicious frost is going to descend on you, not when the plants should have been happily growing out in their permanent positions for weeks anyway, and not when they have grown too weak and gangly in the pots indoors. If you can give the tender young plants the temporary protection of a mini-greenhouse or its equivalent the minute they are planted out, so much the better.

You can, of course, grow a lot of good food without any mini-greenhouses, cloches, or any other protection, even in cold climates. Staple vegetables, like *brassica*, leeks, potatoes and onions will all thrive without protection. But in very cold climates you cannot grow things like melons, tomatoes, eggplants or peppers without starting them off indoors so as to give them warmth for germination. You are, in fact, cheating the climate by extending it forwards when you plant indoors and plant out later. You may well get a really hot summer even in the far north, but it will be a short summer and so you have to try to prolong it.

In April you may wonder what has hit you. This is one of the busiest months of the year. You should now sow the seed-bed with *brassica* and leeks. This little seed-bed, even if it is no bigger than a table-top, is the most important thing in your garden. It holds what will eventually be your main winter vegetable supply.

Beets, carrots and, if you have the room, second sowings of lettuces, peas, spinach, turnips

The Spring Garden

THE PERENNIAL PLOT
You should have removed the straw mulch from your globe artichokes and they will be shooting up fast. The asparagus is growing well and will soon be ready to cut. You will have dug and raked your seed-bed and sown rows of cabbage, kale, cauliflower, Brussels sprouts, all the broccolis, leeks, onions and lettuces.

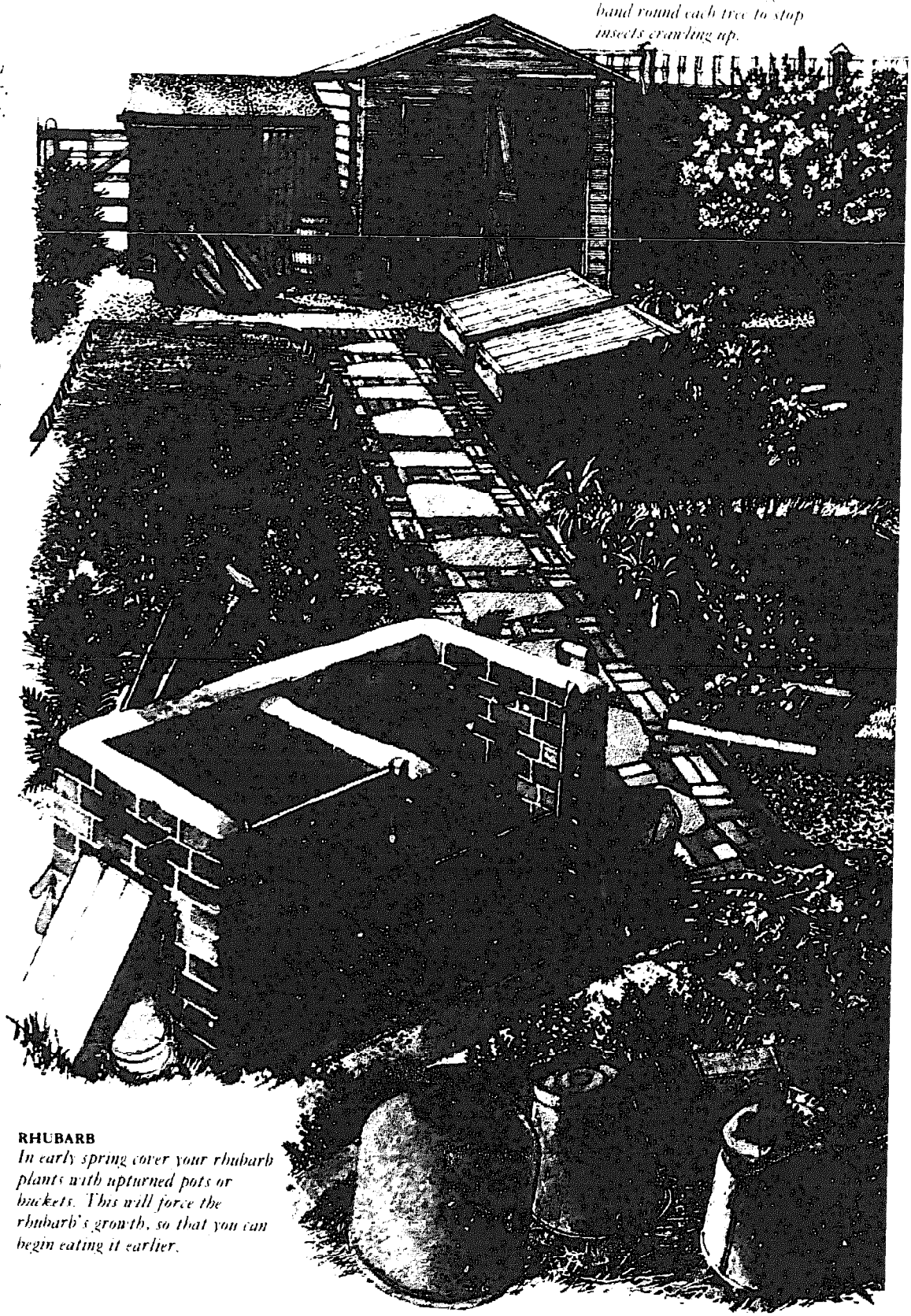
PLOT A
Brassica/Miscellaneous
You will find that the cabbage tribe plants still gallantly surviving on this plot are a sorry sight. They have been supplying you with greenstuff all winter, they have suffered galls and pests, but some of them are still there – the curly kale particularly and perhaps the broccoli. You will probably have picked all your Brussels sprouts, but the tops can still be used for spring greens. The spring is the true "hungry gap": the lenten fast when men and women begin to feel the dearth of fresh greenstuffs. So the remnants of your brassica are useful to you now. Dig over the rest of the bed ready for planting tomatoes, lettuces, cucumbers, spinach, sweet corn, squash, zucchini and melons.

PLOT D
Peas and beans
The leeks that have grown through the winter are your great standby now. As your brassica get fewer, and your stored onions run out, so the leeks come to the rescue. As the leeks are cleared you should sow early peas under plastic or cloches to protect them.

COMPOST
You will have built up a lot of compost over the winter, after almost emptying your bins in the fall for the great soil feeding that follows the harvest. Some can go into the soil now, especially into the potato plot.

THE COLD FRAME
In the cold frame you can sow early lettuces and early cabbages.

FRUIT TREES
Your fruit trees will be bursting into glorious flower. Try to keep birds away from them. Use nets (though this is laborious), scarecrows, pieces of mirror or shiny tin, loud noises and anything else that works. Put a grease band round each tree to stop insects crawling up.



RHUBARB
In early spring cover your rhubarb plants with upturned pots or buckets. This will force the rhubarb's growth, so that you can begin eating it earlier.

Gardening through the Year

SOFT FRUIT
Prune your gooseberries early in spring. Set out strawberry plants in late spring.

THE GREENHOUSE
There is plenty to do in the greenhouse in spring. You must sow seeds of several kinds: celery, tomatoes, peppers, frame cucumbers and melons are the most important. Put them in seed boxes or peat pots. Keep them watered and plant them out as the spring advances. If your greenhouse is heated, you will begin to get a crop from the tomatoes sown in early winter. As the weather gets warmer begin to ventilate your greenhouse.

BEES
Your bees have been dormant throughout the winter. Now you can take the blanket and wire mouse guard out of the hive.

PLOT B
Roots
The green manure crop of vetch, or other winter legumes, is ready to be turned in with a spade or rototiller. Then the first root crops should be planted. Parsnips should be planted first, onions should follow and then a row of early carrots.

PLOT C
Potatoes
You will have planted early potatoes under cover if possible in trenches full of manure or compost. Put one row under sheets of transparent plastic (black and you will have these to protect the others. In late winter you should have brought out manure or compost and left it on the vacant ground ready for digging in with the main crop. Peas should be planted in the late spring.

HERB GARDEN
In early spring you can set out new herb plants grown from rooted cuttings indoors or in the greenhouse over the winter. This is also the time to divide and replant some of your older herb plants. Mint, thyme, origanum and sage benefit from this treatment

and radishes all go into their permanent quarters in April. These vegetables don't like being transplanted and don't need to be; you should sow them in their permanent beds.

April is also the time to plant out all those eager but pampered young semi-hardy creatures that have been growing under glass: cabbages, cauliflowers, early leeks and onions. Their places indoors may be taken by hot-climate seeds such as melons, eggplants and peppers. Sow all these in good potting compost in a warm place.

From now on you will have to keep a constant watch on plants outdoors so that they don't get over-crowded. You will need to thin seedlings carefully, unless you have planted them with a precision drill. The weeds too will by now be feeling the spring. Hoe them out or dig them in. Never let them get too rampant or you will have ten times the work dealing with them.

You may well be planting out new strawberry plants in April. You won't get much fruit off them this year but you will next. You must keep a careful watch this month for insect pests in your tree fruit, and take appropriate action if they get out of hand.

When it comes to planting out plants that have been grown indoors, into frames or under mini-greenhouses, you should give them plenty of protection and not too much air for the first few days, until they have rooted themselves really well into the new soil. A transplanted plant is an invalid for a few days; be kind to it.

Small plants, put out into a deep bed which has been warmed for a couple of weeks with a mini-greenhouse, do far better than those put out in orthodox frames. Of course a true hot-bed is the very best of all; there is nothing like it for hastening things along.

In early May be on the watch for signs of frost late at night. One of these may nip your early potatoes right down and give Mr. Jones next door the opportunity he has been waiting for – his chance to gloat over you as he lifts some tubers the size of small marbles and you don't. If it looks like frost (a clear sky and no wind) cover those potato shoots with something; it hardly matters what. If you are caught out by frost, get out early in the morning and wash the frost off the potato tops and any other plants that may suffer, with cold water.

As ground becomes available, plant out main crop *brassica* from the seed-bed into permanent quarters; or, if you use the holding-bed method, plant them out into the holding-bed. The plants can live happily in the holding-bed until August, moving into their permanent quarters as land becomes free when you harvest other crops. Plant out a few leeks as well, so that you have early leeks in the fall. Main crop ones will transplant much later.

Prepare your celery trenches in late April. This is one of the most useful plants of all because it can be harvested well into the winter. It makes a big difference to the flavor of winter soups and stews, and crisp white celery eaten raw with cheese is a rare delight in winter.

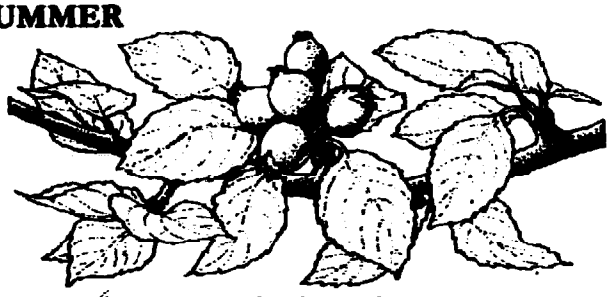
Keep on sowing successionally in May. All the things you sowed outside last month can be sown again now. Keep thinning young plants as they need it: choose rainy days to thin onions or carrots so as not to attract the wily onion and carrot flies. And keep hoeing. An hour of hoeing or weeding in May will save you days later on when the weeds have got the better of you. Hoe the weeds almost before they appear.

Watch top fruit carefully for pests. Remove dead flowers and thin fruit during early June. If you thin all apples, pears and peaches this month you will have a bigger weight of better fruit in the fall. A fruit every five inches (13 cm) is what to aim for.

DEEP BED IN SPRING

In spring you can sow pea seed in the deep bed soil that was limed in winter. Sow to a triangular pattern so that the plants form clumps and not rows. The overall effect will be of very closely spaced diagonal rows. If you can't reach the middle of the bed, lay a board about five feet by three feet right across and sit on it.

SUMMER



By now the strong rhythm of the growing season should have you in its grip and you will be carried along by the inexorable progress of nature. But the early summer does not immediately bring with it the end of the hungry gap.

It is now that you will be grateful that you sowed lettuce, radishes, spring onions and spinach early. These vegetables will give you fresh vitamins at a time when you sorely need them. It is now that you will be watching those very early potatoes with great impatience although their moment of glory will not quite have come.

As far as planting and sowing goes, don't give up now. Successional sowing should be the slogan for this time of the year just as much as it is in the spring. Continue to sow lettuces, radishes, carrots, corn, bush beans, beets and rutabagas little and often; in this way you will have fresh tender young vegetables all through the summer and the fall. It is from this angle that as a home gardener you are at such an advantage. You don't need vast quantities of anything so you can put in half a row – even just a few seeds – and give yourself a constant supply of fresh young food.

As soon as all fear of frost is past and the ground is warm enough, in should go the tender vegetables that can't stand any frost at all, like seeds of pole and bush beans, and soybeans too if you can grow them. At the same time out go the seedlings that you have been nurturing in the greenhouse.

As June begins, the hungry gap eases up and your garden starts to hint at the abundance to come. It is a beautiful month in the garden. You may even be able to stand back and admire your own work for a moment or two every now and then, although this does not mean that you can relax – what gardening writer would ever suggest that? It is in June that the neighborhood contest to see who lifts the earliest potatoes rages. Spring cabbages will be a great standby and spring onions should be available in plenty. If you haven't sown them specially, there will always be thinnings from your main crop onion bed.

June is a bad month for insect pests, but then it is also the month when strawberries come in to cheer the heart and the taste buds. By the end of June you should have stopped cutting asparagus altogether; don't cut another shoot. Give the plants a chance to grow and store up food for next year.

As summer wears on, you will have to consider the question of whether to water or not. In a few fortunate places you can garden all your life, never put a drop of water on the land and yet always have good crops.

A few summers ago throughout the worst drought I have ever known the vegetable garden on my farm grew marvelously, and I never put a drop of water on anything. But the secret is that my land is full of humus and is constantly manured, so my land holds the water like a sponge. Even at the tail end of the drought I could dig down half a spade's depth and find moist earth; the roots of the vigorous, humus-fed crops all went down deep enough to reach it. If I had splashed water about from time to time I would have caused roots to form on the surface where the water was, at the expense of deep penetrating roots, and I would not have had anything like such good plants.

But where I could water really thoroughly I did. For example, I diverted a stream through big plastic drainpipes and directed the water so that it flowed on to my main crop potatoes, and thus I got a heavy yield of potatoes where gardeners who couldn't irrigate got very few.

So the rule is: water well if you water at all. Let the water sink right down to the lowest roots of the plants. This kind of watering does help; summer cauliflowers and lettuces particularly don't grow well during a drought.

The deep bed method is excellent from a water conservation point of view: you need just half as much water for a deep bed as you need for a conventional garden. This is because the looseness of the soil prevents the water rising too rapidly to the surface by capillary action and evaporating; it also permits the roots of plants to move downwards very freely and reach water.

Rain falling on the deep bed sinks in immediately and does not run away, lie on the surface, or evaporate as it does in a conventional garden.

The deep-bed practitioners in California favor a good sprinkling every day or so, so as to keep a moist mini-climate under the leaves of their close-planted crops. But their climate is totally without rain in the summer time and they have to water. The same does not apply in the British Isles or in

The Summer Garden

THE PERENNIAL PLOT
Remember the rule that no more asparagus must be cut after the last day of June: the beautiful ferns must now be allowed to grow undisturbed. Globe artichokes are growing vigorously and will be ready to eat soon. Try to pick your globes very young, for you can then eat practically the whole flower, wasting nothing.

SEED AND HOLDING-BEDS
The brassica plants you sowed in the seed-bed will all have left it by now. Some are in the holding-bed and others are in their permanent bed, Plot D. The seedling leeks, lettuces and onions in the seed-bed are beginning to get overcrowded and should be planted out as soon as possible.

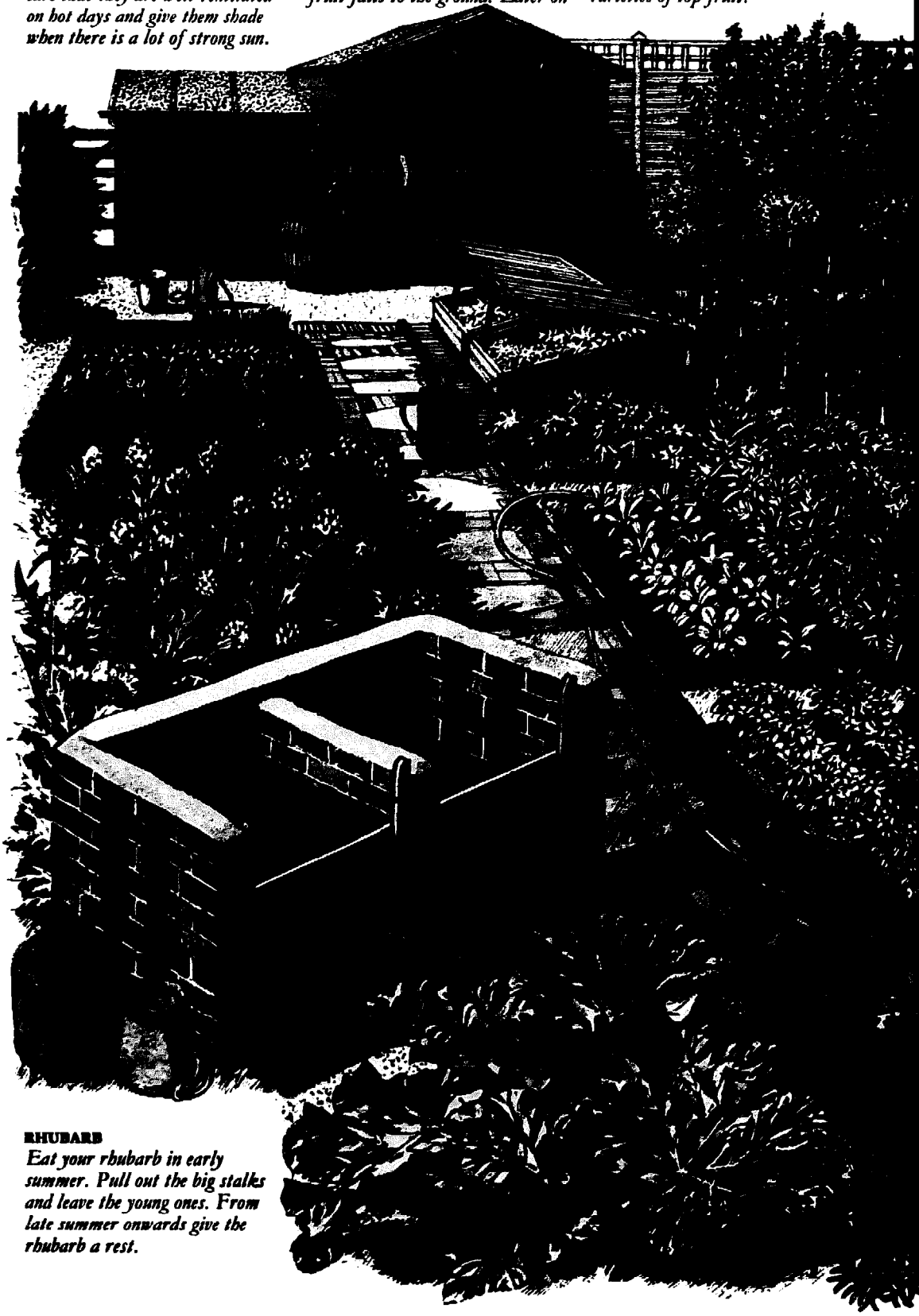
PLOT A
Miscellaneous
This was last winter's brassica bed, but from now on it will be taking most of the vegetables that don't fit naturally anywhere else. Tomatoes, sweet corn, spinach, lettuces, celery and all the squash tribe fall into this category. If you suffer from eel worm badly, it will pay you to put tomatoes in with the potato patch, so as to give a longer break between solanaceous plants.

PLOT D
Peas and beans/Brassica
The broad beans will be almost finished by now so you should soon be removing the plants, just leaving a few to produce seed for next year. As these crops are cleared, you will be moving brassica plants out of the seed-bed or holding-bed to take their place. Plant bush beans in early summer. Along with peas and pole beans they will begin to bear as the summer wears on.

COMPOST
At this time, when growth is at its most rampant and many plants must be pulled up or cut back, your compost heaps will grow very fast. Through them you feed the soil, through that your crops and through these yourself!

THE COLD FRAME
By now this will be full of cucumbers, peppers, eggplants, melons, and any other vegetables which need extra warmth. Make sure that they are well-ventilated on hot days and give them shade when there is a lot of strong sun.

FRUIT TREES
Thin out young fruit in early summer; otherwise you may find that you suffer from the "June Drop" which is when immature fruit falls to the ground. Later on you will have some summer pruning to do. Watch out for infestations of insects; otherwise leave fruit alone. Late summer will see you harvesting early varieties of top fruit.



RHUBARB
Eat your rhubarb in early summer. Pull out the big stalks and leave the young ones. From late summer onwards give the rhubarb a rest.

SOFT FRUIT
If you are starting a new strawberry bed, high summer is the time to plant out seedlings which will begin to fruit next year. Most of your strawberries will have been picked in early summer. Pick currants and gooseberries as they ripen.

THE GREENHOUSE
In summer the greenhouse can be left dormant, or given over to flowers.

BEES
The summer is the time when your bees need special attention. In the early summer stop them swarming; later on take honey from them as they make it. Always see that they have enough spare combs to build on.

PLOT B
Roots
All you need to do here during the summer is hoe, watch onions for onion fly, carrots for carrot fly, and wait for things to grow. If you have space to spare, sow some more carrots, as well as rutabagas, turnips and beets.

HERB GARDEN
The summer is the time for harvesting herbs, for drying them quickly in the wind and shade, and for storing them in airtight jars when they are quite dry.

PLOT C
Potatoes
Most of this bed will be occupied with main crop potatoes. You must weed them, and spray them with Bordeaux mixture if you fear blight. The earlies will mostly have been pulled by now and their places taken by leeks.